

# Radio Control **CAR ACTION**

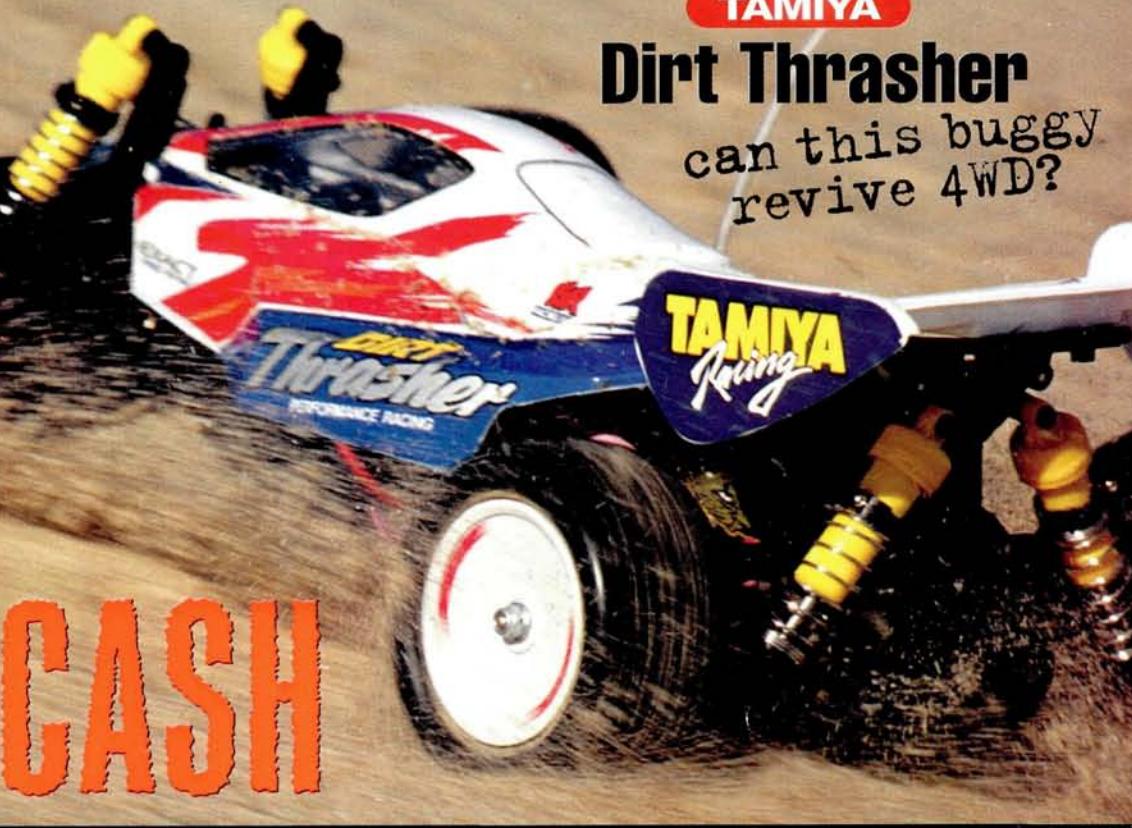
THE WORLD'S LEADING R/C CAR MAGAZINE

TOURING CAR  
DRIVING TIPS



April 1996

**GO  
FAST  
WITH  
LESS CASH**



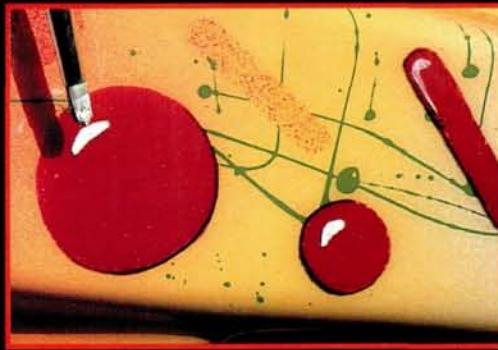
TAMIYA

**Dirt Thrasher**

can this buggy  
revive 4WD?

**52**  
**BUDGET  
MODIFIED  
MOTORS**

Which is right  
for you?



**HOW TO**

**Simple paint tricks**

Create a show-stopping  
body using spray cans

**Fix stripped threads**

Don't throw it out!

■ SCHUMACHER BOSSCAT TOURING CAR

■ BRP SUPER OVAL OUTLAW

■ TEKIN REBEL—an affordable  
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**6 Editorial**

**8 Letters**

## DEPARTMENTS

**14 Readers' Rides**

**17 Inside Scoop**

by Chris Chianelli

**26 What's New**

**132 Grassroots Racing**

**168 Index of Manufacturers**

**169 Classifieds**

**178 Chris's Back Lot**

by Chris Chianelli

## COLUMNS

**23 Pit Tips**

by Jim Newman

**24 Troubleshooting**

by George M. Gonzalez

**28 Getting Started**

by Brian Leslie

**33 Scoping Out**

by John Rist

**36 R/C Doctor**

by Doug Mertes

## THRASH TESTS

**40 Tamiya Dirt Thrasher**

Should this be your first 4WD, off-road buggy?  
by Dan Haas

**46 Schumacher BossCat 4WD Touring Car**

High tech without the high price  
by Derek Buono

**50 BRP Super Oval Outlaws**

1/8-scale mini-racer  
by George M. Gonzalez

ON THE COVER: the Tamiya Dirt Thrasher (photo by Walter Sidas); using spray cans to create a hot scheme (photo by Mike Ogle).

THIS PAGE (top to bottom): the Schumacher BossCat 4WD Touring Car (photo by Walter Sidas); a couple of the motors in our Budget Modified Motor Guide (page 73).

pg. 46



# Radio Control CAR ACTION

VOLUME 11, NUMBER 4 • APRIL 1996

## features

**54 How To: Sedan Driving Tips**

Pro techniques to go faster • by Aaron Biner

**60 How To: Cheap Paint Tricks**

Paint a concours winner using spray cans  
by Mike Ogle

**73 Budget Modified Motor Guide**

Choose a motor to help you go fast and spend less • by Doug Mertes

**86 Does Cost-Controlled Racing Really Work?**

An inside look at Trinity's successful Street Spec program • by John Howell

**92 Project Formula 1, Part 2**

Adding electronics and running gear • by Mike Ogle

**108 Tamiya Grand Prix World Championship**

U.S. champs take on the world

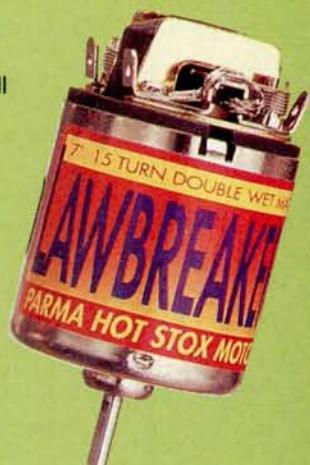
**115 2nd Look: MRC Baja King**

Revisit this popular monster truck • by George M. Gonzalez

**126 How To: Repair Stripped Threads in Plastic Parts**

Easy solutions to a common problem  
by Doug Mertes

**170 Track Directory**



pg. 73

## EDITORIAL



# Equal-opportunity racing

**Spec-class racing is the perfect venue for newcomers to get in on the action.**

**W**hat does equality in racing mean? Generally, it means that everyone has equal access to equipment. For example, I can buy the same type of car kit that was used to win a national or world championship. I can buy the same brand of batteries, the same pinion gear and the same drive shafts. But put me and my new car on the starting grid against the champ, and the racing will be anything but equal!

Most current racing rules, though they fairly address such equipment variables as tire size, car dimensions and weight, don't really take drivers' skills into account. As a result, beginning racers are more likely to find themselves vastly outgunned and exceedingly frustrated. Perhaps what's needed for truly equal racing is the additional breakdown of classes—not merely by equipment, but by experience and budget as well.

Race organizers should realize that, although many racers enjoy adding hop-ups and accessories to their R/C vehicles to remain competitive, there are many who either can't afford to upgrade their equipment or simply choose not to. Rather than risk losing the latter group by forcing them to compete against racers who have more experience or more money, astute track owners are getting on the cost-control-racing bandwagon by participating in one of the national, spec-type programs.

Some of the most successful programs include Trinity's Street Spec, Bolink's Legend Series and Kyosho's R/C Sport Program. Recently, editor John Howell had the chance to participate in a Trinity Street Spec event (see John's feature on page 86), and he returned with overflowing enthusiasm for this type of cost-controlled competition. In the near future, you can expect to see these programs grow in the U.S. and possibly expand to an international scope. As a result, it's safe to say that cost-controlled racing is coming to your hometown! Our hats go off to those insightful manufacturers, organizations and promoters who have created and nurtured this important segment of the hobby.



Frank Masi, Executive Editor

**We want to hear from you!** Write, fax, or e-mail us on the Internet: *R/C Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035; fax: (203) 762-9803; e-mail:

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**YOUTHFUL FASCINATION**

I'm 12 years old, and I am just starting a new fascination: R/C cars. I have loved racing since I was little and have always wanted to compete. Are there any R/C tracks in Indiana? Is there an age limit at R/C tracks? And what do the abbreviations ESC and 2WD and 4WD stand for? Thank you for your help; and maybe I'll see ya sometime—racing, I hope.

**MATTHEW YOUNGER**

*ayounger@hamlet.ucs.indiana.edu*

Well, Matthew, we know of about 14 tracks in Indiana. If you check the Track Directory in this issue, you'll find their names, addresses and phone numbers. I've never heard of an age limit at any track; everyone is always welcome to race. As for those abbreviations, here's what they mean:

- ESC: electronic speed control—a device that replaces the mechanical speed control and electronically controls/regulates power to the motor.
- 2WD: two-wheel drive—a rear-wheel-driven R/C vehicle. You'll often find it mentioned in articles referring to an off-road racing class in which buggies are used.
- 4WD: four-wheel drive—a four-wheel-driven vehicle. You'll see it mentioned in reference to a racing class for sedans and off-road buggies. Hope this helps; good luck racing.

*Stacey*

**A NEW CLASS OF RACING?**

Many people enjoy the thrill of off-road racing and just plain old bashing around; some enjoy the economies of parking-lot racing; and there are also those who are unfortunate enough to live too far away from any decent off-road track. Well, why not combine the two racing classes to form an on-road/off-road track?

Using your standard off-road racing buggy or truck (with on-road tires, of course), you could race in parking lots but also have jumps, bumps and other obstacles. Of course, they wouldn't be as dramatic as those on an off-road track, but it would be a blast. You could use the curb for a drop, plywood joined by two-by-fours to make a set of mild jumps, and anything else you might think of.

I've used many objects as obstacles; all took little or no effort to set up. This type of parking-lot/off-road fun would be great.

One more question: where's a good place to get a bitchin' airbrush job for my body, and how much does a good one cost? Thanks for a great magazine.

**CHRIS KREIDEL**

*Huntington Beach, CA*

Chris, I think your idea is great, and you'll be pleasantly surprised to hear that you won't have to travel too far to find this kind of racing action. Hobby Shack, which has a store not even 20 minutes from your door in Fountain Valley [(714) 964-8846], has one of the most successful parking-lot racing programs in the U.S. They run a special

buggy and stadium class that features jumps, bumps and laughs galore. Give 'em a call and start thrashing!

By the way, Frank, John and I are converting our off-road buggies into on- and off-road rally cars, and we plan to race them at a local BMX track. We'll write about our experiences in the near future, so stay tuned. As for getting your R/C body painted, Andy Jacobsen—Andy's R/C Products—is the airbrush wizard in Southern California. He distributes his custom-painted bodies to hobby stores all over the country, including Hobby Shack, and they sell for \$25 to \$50. You can call him at (909) 923-6155. Elsewhere, Richard Muise (Motion Graphics—[410] 848-0008), Scot Bich (Bich'n Bodies—[713] 485-0413) and Todd Kerby (TK Designs—[801] 288-1720) all produce spectacular custom paint jobs. Good luck!

*George*

**RUNNIN' A RUSTLER**

Would Pro-Line Dirt Hawgs fit a Traxxas Rustler? What's the fastest inexpensive motor I could install that would keep me in control? What are custom-painted bodies? Which battery pack would give me the longest run time? What's the fastest inexpensive peak charger for the Rustler? Which radio does the RTR Rustler come with? Is the Rustler a good neighborhood basher? Why don't any of the pro racers ever use some other car or truck, such as the MRC MT-10S, the Traxxas Rustler, or the Tamiya Stadium Blitzer? Keep up the great work.

**DENNIS "KETCHUP" COX**  
*Lancaster, CA*

Hey, Dennis! That's 11 questions, so I'll keep my answers short. Yes, Pro-Line Dirt Hawgs will fit the Rustler. If you plan to use the mechanical speed control, stick with a stock motor.

Custom-painted bodies are professionally painted or airbrushed for you. Panasonic 1800mAh batteries will give you plenty of run time. I can't tell you which is the fastest peak-charger because there are too many variables; sorry. The RTR Rustler comes with a very basic, but effective, Traxxas transmitter and servos.

The Rustler is the perfect backyard basher, and with a little tweaking, it's a good racing truck. Professional racers are sponsored by the company that manufactures their cars or trucks. MRC, Traxxas and Tamiya don't sponsor racers. Sponsoring drivers and funding a factory racing team is very expensive.

*George*

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# =DAHM'S=

## RACING BODIES

### LETTERS



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### PROBLEMS IN THE PACIFIC

I've been into R/C cars for nine years now, and I've been reading your magazine just as long. I had a Kyosho Turbo Optima. I say "had" because I just drove it off a pier in Portugal where my ship is moored (I'm in the Navy). Needless to say, I'm in the market for a new car. In your November '95 issue, I noticed Doug Mertes' "Thrash Test" on the Tamiya ProMarkt Mercedes 4WD sedan. Doug mentions that the car uses a TA02 chassis and that it's a derivative of the Tamiya Manta Ray off-road buggy. How close to the TA02 is the Manta's chassis, and can some of the chassis parts made by HPI and Kose be used on it? Thanks for your help, and keep up the great articles in your mag. (San Dimas High School rules!) **IAN C. POTTER**

**USS Dewert FFG-46**

*Somewhere in the Pacific Ocean*

Ian, the Manta Ray (TA01) chassis is very similar to the TA02 chassis, and many of the parts are interchangeable. The Manta's chassis will accept many of the aftermarket hop-ups, such as suspension arms, caster uprights, axle carriers, shocks, wheels and tires, etc. The gearboxes are slightly different, however, so the chassis are not interchangeable. If you're thinking of converting a Manta Ray into a sedan, it could be done; the very first Tamiya sedan—the Skyline GT-R—was based on the Manta Ray's TA01 chassis. Good luck!

Oh, and I agree that San Dimas High School does have a rockin' football team. I used to live in Arcadia, CA, and I played four years of high school football, so I know firsthand.

**George**

### COMPLIMENTS AND COMPOSITES

First off, I would like to compliment you all on your February issue; it was great. I especially liked the 10-year compilation. There were a lot of great "blasts from the past" that I had forgotten about. That picture of Chris with a perm is a classic; it must be very interesting to work with him. Anyway, the reason I'm writing is to ask you about



Team Losi's graphite composite pieces for the Double-X buggy and the Double-XT truck. First, are the pieces (the chassis set, shock towers and suspension arms) really made of graphite? I thought graphite was woven and only produced in plate form. And second, when would you recommend that a racer upgrade to these pieces? I race as much as I can around this area, and I'm thinking of even traveling to hit some of the more popular tracks around the country. I just want to make sure my rides are as dialed in as they can be! One last question: how come there isn't a graphite front shock tower for the buggy? Thanks for the time, and I'd like to say again that you guys have a kickin' magazine!

**JOE VICK**

*Darien, CT*

Thanks for all your kind comments, Joe. We had a blast looking through all the old photos that we've accumulated over the years. It took us awhile, but it was fun. Now on to your questions. You're right; most people are accustomed to seeing graphite produced in plate form. Here's a basic rundown on how Losi makes its molded pieces. First, a tool or a cast of the molded part is made; then a nylon composite material (Stiffezell) is injected into the mold. In that composite are strands of fiber that add rigidity to the piece. When a similar graphite part is made, the same mold is used, but the composite is altered a little. Instead of using the regular fibers that are in the original composite, graphite fibers are used, which make the part even stiffer. I race my truck and my buggy with the graphite pieces. It makes them both a little lighter, and it helps the suspension work more efficiently. It's up to you to determine whether you need the graphite parts. It will also depend on your level of involvement in racing and on your budget. I spoke with Jack Johnson at Team Losi about your question regarding the buggy's front shock tower, and here's what he said: "Since the original kit's front shock tower isn't made in a composite mold, we wouldn't tool up a new part for doing a molded graphite piece. Instead, we'd have to use a laminated graphite plate, which is typically brittle. Since the shock tower is exposed to rollovers and crashes, the chances are pretty good that a graphite shock tower would break pretty quickly or the edges would fray. The stock one is more durable than a graphite one would ever be." So there you have it, Joe. Good luck and have fun!

**Doogie**

# READERS' Rides

## THAT'S ALL FOLKS

This "Looney" ride comes from Greg Raciti of Peekskill, NY. Greg says he's a "Looney Tunes" buff, and he thought it would be cool to display the characters on his Team Associated RC10LSO. He cut all the decals out of adhesive MonoKote. Controlled by a Futaba PCM 1024 radio, this car is topped off with a '95 Protoform Grand Prix stock body, and it has a Novak Hammer Pro ESC and a Trinity Midnight motor. Sounds fast, Greg! But can it outrun the Road Runner™?



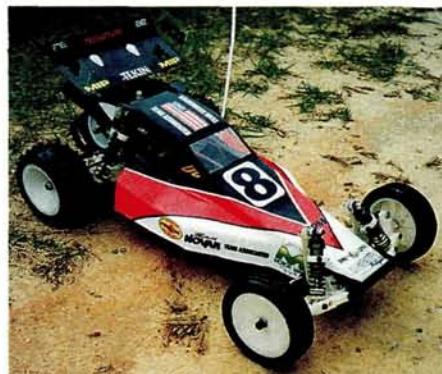
## WHAT ABOUT DRIVING LESSONS?

Francisco Sotomayor sent us this photo of himself teaching Indycar driver Adrian Fernandez a few of the basics of R/C. Francisco set up his Trinity EV10 with a paint scheme similar to that on Adrian's Tecate/Quaker State Indycar. According to Francisco, the team invited him to visit their Mexican office, they signed his R/C body and posed for several photos, and they now support his local R/C association (Radio Control Pilot Association). Francisco's ride is set up with a Reedy Sonic G, a Novak HPC and a Futaba AM radio system with a high-speed servo, and the body is an altered, narrow Civic made to look like a Reynard VW Golf.

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 251 Danbury Rd., Wilton, CT 06897. If we choose your photo, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the fifth annual "Reader's Ride of the Year Contest" in the fall of 1996. Write your address and phone number on your letter and on the back of each photo you send, in case we need to contact you.

## CLEAN TEAM

Chuck Tutt's ultra-clean Associated RC10 Team Car is all tricked out with a Novak 410-M5 ESC, a Futaba Magnum Jr. radio system, a graphite tranny brace, RPM heavy-duty ball cups, MIP ball-bearing, bellcrank steering system, Tecnacraft titanium turnbuckles, Reedy cells and a Reedy or Motor Man motor and Robinson



pinion and spur gears. Though Chuck has had the car for more than a year, it hasn't seen much racing duty because he has been busy with college. Having finished school, Chuck is now looking forward to hitting the dirt again.



## T2 AT TIGER'S

If you head down to the Tiger's Den Speedway in Arlington, TX, you'll probably find Cassidy Moore racing this Associated RC10T2. It is equipped with a full set of ball bearings, two Duratrax Gold shocks and a slipper clutch. Futaba radio gear sends the signal to a Novak Hammer Pro, which controls a Trinity Midnight stock motor on race days or a Trinity Green Machine 2 on just-for-fun days.

In search of fun  
and glory, 'cause  
life's too short  
to be a sheep • by Chris Chianelli

# INSIDE SCOOP



These are the first photos of Kyosho's new Super GP-10 series chassis. Similar in size to 1/10-scale, on-road gas racers, such as the Serpent Impact, the Super GP-10 is a more performance-oriented chassis that's capable of handling the considerable power of Kyosho's new GT-15, .15-size glow engine. Shown here on the Super GP-10 chassis is Kyosho's exclusive new McLaren F1 GTR body.

Other available body styles include a Toyota Castrol Supra, a Honda NS-X LM GT1 and a Nissan Skyline GT-R.

## Kyosho Models the World's Fastest Street Car

### The Winning Formula

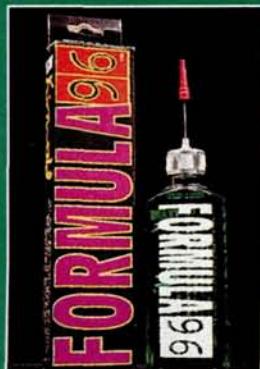
New in Trinity's lineup are these specially developed comm drops for stock and modified off-road motors. The formula, aptly called Formula '96, was developed for motors that are constantly subjected to high loads and operate in dirt. Formula '96 helps break in brushes by keeping them

Bolink has recently introduced a couple of new super-speedway bodies that are designed to cut through the air like straight-edge razors. Designed using information gathered during the testing of their full-scale counterparts, the new '96 Monte Carlo and '96 Pontiac Grand Prix are built low to the ground for improved aerodynamics, and they have molded-in roof rails for increased stability at high speeds. Both bodies are molded of high-quality

Lexan and are available in Pro-Lite polycarbonate for that competitive edge. Get your narrow superspeedway up to speed with these cool-looking bodies (pardon the pun).

For more information, contact Bolink R/C Cars Inc., 420 Hosea Rd., Lawrenceville, GA 30245; (404) 963-0252; fax (404) 963-7334. (Monte Carlo—part no. BL-2274, \$19.95; Grand Prix—part no. BL-2275, \$19.95. Add "L" to the part number to order them in Pro-Lite.)

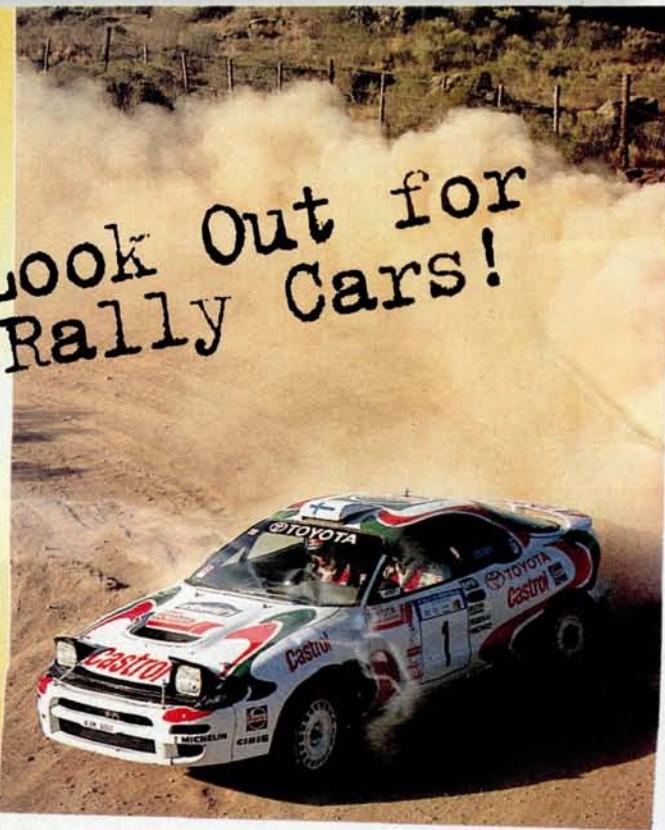
### BOLINK'S BODACIOUS BODIES



and the commutator lubricated so there's no brush scoring or carbon build-up. The drops also keep your motor running faster and longer, and they increase power when used at the start of each race. Formula '96 comes in an easy-to-use, needle-tipped container, so the drops can be precisely placed on motor brushes. For more information, contact Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

**A**s you know, I have spies planted throughout the R/C industry. I don't usually condone covert activities, but sometimes, you have to go to extreme lengths to get the story! The latest reports from the field have led me to believe that there's a new trend brewing in the hobby—rally cars! Think about it; dust off that old RC10, JRX-Pro, Optima (or any off-road buggy, for that matter), mount a full-fendered, realistic-looking rally-car body, and add a set of scale-looking, treaded rally tires. Wouldn't rally cars be great! You could run them anywhere—on pavement, gravel, or even a dirt, off-road track. And with the rally bodies, there would definitely be some old-fashioned, fender-rubbin' racing action! At press time, there's at least one big manufacturer giving this segment a serious look. Also, "Howdy" Masi tells me that he's secretly working on converting several popular 2WD off-road buggies into rally cars. As soon as he's ready, or if I hear any more from my spies, I'll put it in "Scoop," so stay tuned.

Look out for  
Rally Cars!



## Super Stopping Power

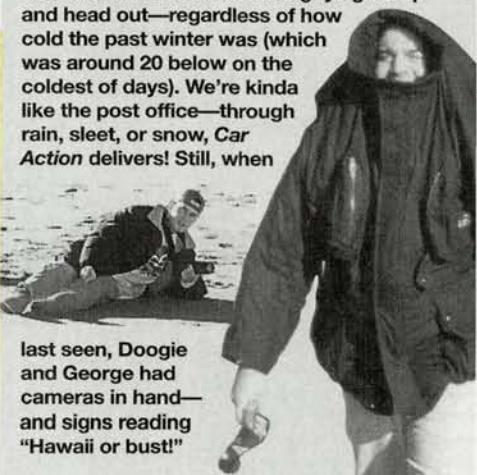
The latest rage in R/C is anti-lock brake systems. Some high-end electronic speed controls now have them, but what are gas racers to do? Well, it looks as if Sanwa (Airtronics here in the U.S.) has come up with an answer. What you see here is Sanwa's ALB unit (Anti-Lock Brake Booster). From what we can tell, you place the unit between your receiver and the throttle/brake servo, and it "pulses" the signal going to the servo, which, in turn, smoothes out the braking action. The brakes no longer actually "lock up." It looks as if you can even adjust the sensitivity of the unit. Pretty cool, isn't it? As soon as we get more information about U.S. availability, we'll pass it along.



"Anyone see any frozen flagpoles around here?" editor John "Doogie" Howell shouts across the East Coast's winter tundra. Associate editor George "Admiral Bird" Gonzalez finds Connecticut's winter a little colder than the LA winters he's used to!

**COLD & COLDER**

With spring around the corner we thought we'd show you what we do when we need that killer action shot. These guys gear up and head out—regardless of how cold the past winter was (which was around 20 below on the coldest of days). We're kinda like the post office—through rain, sleet, or snow, *Car Action* delivers! Still, when



## MAXTEC GETS PREDATORY!



For more information, contact: Maxtec Development, 3740 Overland Ave., Ste. B, Los Angeles, CA 90034; (310) 815-0251; fax (310) 815-0253.

Look out! There's a new touring car in town, and parking-lot tracks all over America will be prey for this Predator. The Tenth Technology Predator touring car is now being exclusively imported by Maxtec Development, and it will be available in two versions: a partial bearing kit and a full bearing kit. Both kits will be available with either an Opel Calibra or an Alfa Romeo body.

## Trinity Presents The SPEED GEMS Collection



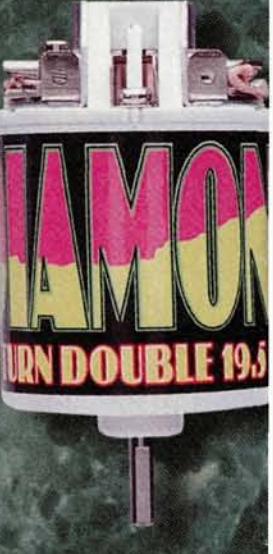
**-TOPAZ-**  
4WD Buggy/1:10 Oval



**-RUBY-**  
2WD Trucks/Buggies  
1:10, 1:12, 1:14, 1:16



**-SAPPHIRE-**  
Monster Trucks, Planes, Boats  
17 Turns, 1 Wind



**-DIAMOND-**  
1:10 On-Road/Oval  
12 Turns, 2 Winds

## INSIDE SCOOP



### Neato Nismo

The newest member of Tamiya's popular (and large) touring-car family is this Nissan Skyline NISMO Clarion GT-R (hold on, I'm almost done) Le Mans DTM racecar (whew!). With its twin-turbo, 6-cylinder engine and sophisticated all-wheel-drive system, Nissan's Skyline GT-R is the meanest road car ever to prowl the streets of Japan. Tamiya's 1/10-scale Skyline, which uses the wide version of the venerable TA02 4WD chassis, should prove just as formidable as the full-size version. Oh, and check out those trick, two-piece wheels and the adjustable rear wing. If I could just fit into the cockpit! If you're as into this Skyline as I am, it's part no. 58165, and it retails for \$305. Contact Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; fax (714) 362-2250.

## Jaco's Aqua-Tread

Those foam-donut gurus at Jaco let me take a sneak peek at their newest tire compound—Aqua dots. According to inside sources at Jaco, these new Aqua dots provide better traction on most surfaces than Green dot foams, and they work particularly well on asphalt. As well as the increase in traction, wear characteristics are similar to Greens. Typically, Aqua dots "durometer out" at about 28 to 32 degrees, which basically means that they are remarkably firm for such high-traction



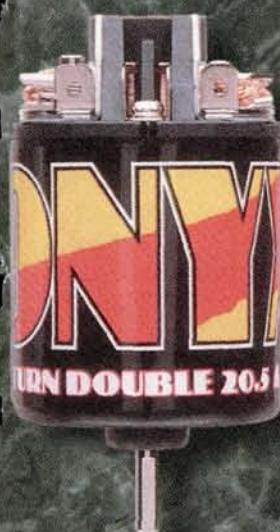
tires. Also, while the performance is on a par with their more exotic Pink and White dot compound tires, the price of the Aqua dot is identical to that of the standard Green or Blue dot. So, how long do they really last? Well, let's just say they last longer than Aquaman's career as a superhero! For more info, contact Jaco, 423 West Spotswood Trail, Elkton, VA 22827; (703) 298-0446.

### A Little Bit of Courage

Looking for a new 1/12-scale body? Do you want something a little different? PROTOform's first WSC body for 1/12-scale racing has been modeled after the Chevy-powered Courage C41 as it was raced in the 24 Hours of Le Mans. I've been informed that the body was designed to fit all popular brands of chassis, and the front wheel openings were configured to reduce the risk of cutting into the front tires. The C41 is available in light .020 or regular .030 Lexan, and it features a molded-in driver's helmet figure. For more info, contact PROTOform, 201 W. Lincoln St., Banning, CA 92223; (909) 849-9781; fax (909) 849-2968.

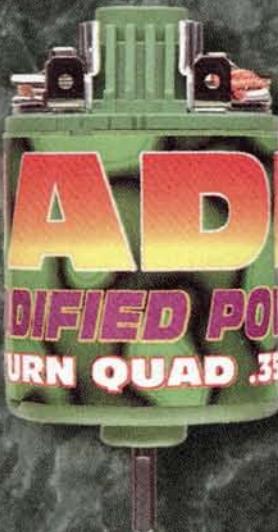


## Rare Examples Of Performance And Economy.



### -ONYX-

2WD Trucks/Buggies  
14 Turns, 2 Winds  
29,100 RPM, No. 9204



### -JADE-

2WD Trucks  
15 Turns, 4 Winds  
27,060 RPM, No. 9206



### -QUARTZ-

Touring/F-1, Planes, Boats  
19 Turns, 2 Winds  
21,540 RPM, No. 9207

Speed Gems machine wound modified motors are an excellent alternative for a racer on a budget. Constructed with the same superior quality components as our expensive modified motors, they have a machine wound armature. This combination produces an extremely fast motor at about half the cost of a hand wound. Only \$49.99 list. For a rare combination of performance and economy, acquire a Speed Gem today.

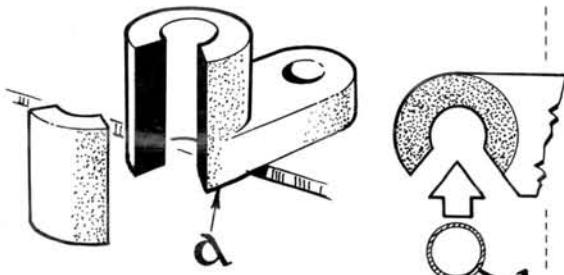
## TRINITY

1901 East Linden Avenue, Suite 8  
Linden, New Jersey 07036  
Telephone (908) 862-1705  
Facsimile (908) 862-6875



## PIT TIPS

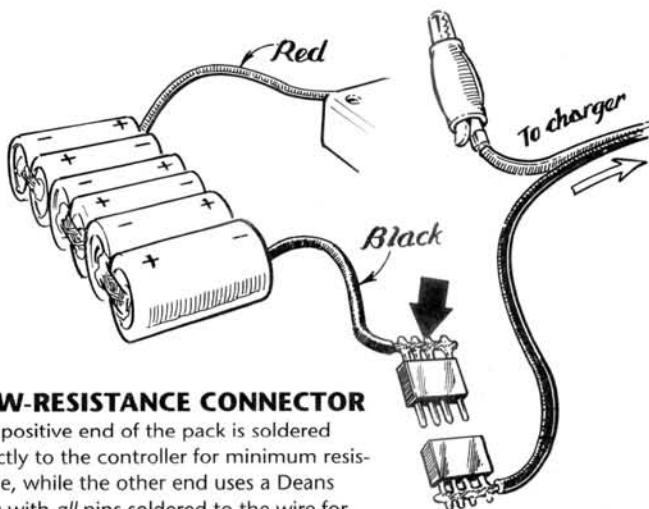
by Jim Newman



### QUICK-CHANGE ANTENNA

To quickly switch the receiver and the antenna to another car, carefully saw out a pie-shaped segment of the antenna holder so that the antenna tube can be easily snapped in or out.

*Joe Cianfrani, Mesa, AZ*



### LOW-RESISTANCE CONNECTOR

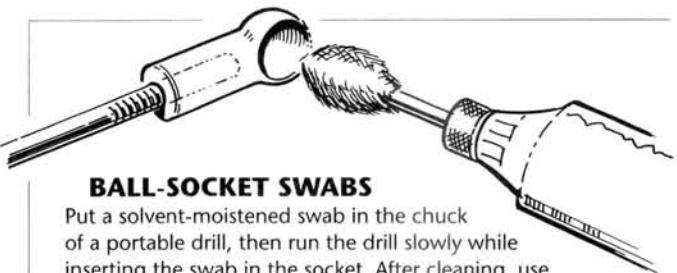
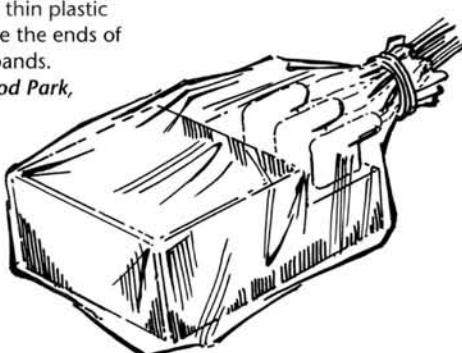
The positive end of the pack is soldered directly to the controller for minimum resistance, while the other end uses a Deans plug with all pins soldered to the wire for lower resistance and for connection to a charger. The alligator clip goes to a suitable positive connection while charging.

*Paul Kostura, Fountain Hills, AZ*

### SHOWER-PROOF RADIO GEAR

To keep water off your radio gear, wrap the electronics in thin plastic bags, and tightly secure the ends of the bags with rubber bands.

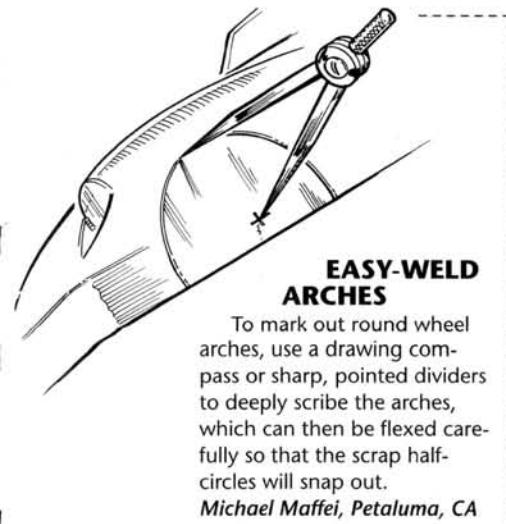
*Curtis Andritz, Sherwood Park, Alberta, Canada*



### BALL-SOCKET SWABS

Put a solvent-moistened swab in the chuck of a portable drill, then run the drill slowly while inserting the swab in the socket. After cleaning, use a little silicone or lithium grease on a toothpick to lubricate the socket.

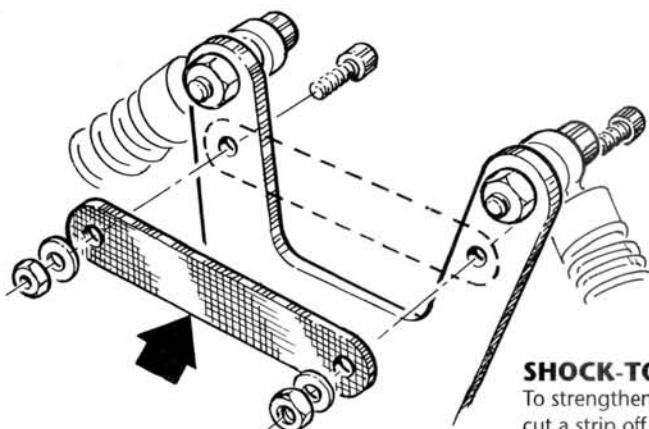
*Quan Rusk, Braddon, ACT, Australia*



### EASY-WELD ARCHES

To mark out round wheel arches, use a drawing compass or sharp, pointed dividers to deeply scribe the arches, which can then be flexed carefully so that the scrap half-circles will snap out.

*Michael Maffei, Petaluma, CA*



### SHOCK-TOWER BRACE

To strengthen your shock towers, cut a strip off a broken shock tower or a piece of printed-circuit board, and bolt it across the tower.

*Sam Lee, North York, Ontario, Canada*

*Radio Control Car Action* will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.



## TROUBLE SHOOTING

by George M. Gonzalez

### ESC QUERIES

I'm getting a Team Associated RC10T2, and I already have a JR Beat Gear Radio. My problem is choosing the right motor for the ESC that I'm thinking about buying. I'd like to get the Novak Rooster because it

isn't too expensive, and it has reverse; which motor will give me fast speeds without overheating it? I'd also like to get an ESC that can have the reverse disabled for racing, such as the Novak 610 Reversible; which motor would be good for that?

**ALBERT KREIDEL**  
Middleton, WI

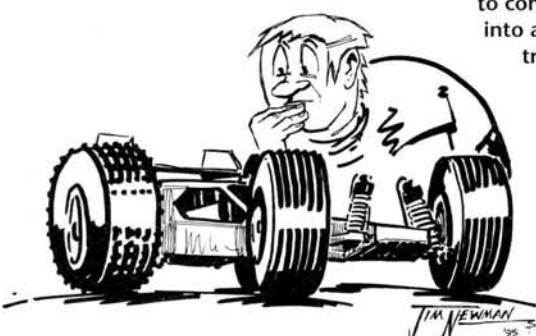


### BUGGY GONE STADIUM RACER

I have a Kyosho Pro-X Sport. It has a Tekin Formula 10 ESC, a Reedy Force motor and an Airtronics radio system. I replaced the tranny bushings with bearings, and it handles great. I was wondering what I can do to mount stadium-truck wheels on it? Should I?

improve performance; in fact, it may decrease performance, because it raises your buggy's center of gravity (CG). You'll have to install front and rear axles from Kyosho's Pro XRT racing truck and gear down a couple of teeth to complete the conversion. If you want to convert your buggy into a full-blown racing truck, you'll have to replace so many parts that it would be cheaper to buy an entire kit. Replacing the front wheel bushings with bearings will improve the performance and reliability of your

buggy, and it's an upgrade that I'd recommend. Bushings need constant maintenance to keep running smoothly, and they don't last very long. Bearings, on the other hand, require less maintenance, last a long time and run relatively friction-free.



Also, what would replacing the wheel bushings with bearings do? Thanks for your time and the great magazine; it's the only thing I read.

**SCOTT LIAN**  
Bow, NH

Scott, installing stadium-truck wheels on your Kyosho Pro-X sport won't

more than 17 turns.

If you decide to buy the Novak 610 Reversible, you won't have to worry about which motor to buy, because it handles them all. Its reverse may be disabled, and it has HYPERFET transistors, and that makes it ideal for racing and serious backyard bashing.

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you.

Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 251 Danbury Road, Wilton CT 06897. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

### OUTRAGEOUS ST

I'm 12, and I have a Kyosho Outrage ST, and my brother has a Tamiya Super Grasshopper. I have a couple of questions about both of them. First, the Super Grasshopper has a broken shock, and I don't know where to get a new one. The hobby shop says that it will cost a lot of money to fix because they don't make them anymore. I want to turn my Outrage ST into a more competitive truck. What hop-ups should I buy? Thank-you and, by the way, I love your magazine.

**JOEY WESTLAKE**  
Tecumseh, MI

Joey, I called Tamiya America and found out that you can order replacement shocks for your brother's Super Grasshopper. You didn't tell me whether it was the front or rear shock that broke, so here are both part numbers: front

CVA mini-shock set—part no. 50332; rear CVA short shock—part no. 50305. Order the part directly from Tamiya by calling (800) 826-4922 or from your hobby store.

You can make your Outrage ST more competitive by ordering some hop-up items from Great Planes Model Distributors at (800) 682-0948, or you can order the parts from your local hobby store. Here are some Kyosho hop-up items that will make your Outrage ST into a more competitive truck:

- ball-bearing set—part no. 1974;
- ball diff—part no. 0109;
- adjustable tie-rod set—part no. 5005;
- universal swing-shaft set—part no. 5067;
- spring assortment set (short)—part no. 5013S;
- spring assortment set (long)—part no. 5013L.



# WHAT'S new

## FUTABA High-Output Servo

This servo features high speed and torque and uses a coreless motor

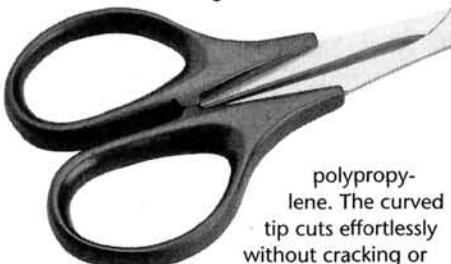
and output-shaft ball bearing for exceptional performance.

It has brass gears, SMT assembly, shock-mounted potentiometer, Futaba IC and thick-plated mini connector. Speed—0.10 second/60 degrees; torque—111 oz./in.

**Part no.—FP-S9402;**  
**price—\$149.95.**  
Futaba, 4 Studebaker, Irvine, CA 92718; (714) 455-9888; fax (714) 455-9899.

## DURATRAX Body Scissors

Made of stainless steel, these scissors are perfect for cutting a wide variety of plastic materials, including Lexan and



polypropylene. The curved tip cuts effortlessly without cracking or tearing. The comfortable plastic handle provides greater cutting control so that you can easily trim all your car bodies.

**Part no.—DTXR1150; price—\$11.99.**

Duratrax; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104.

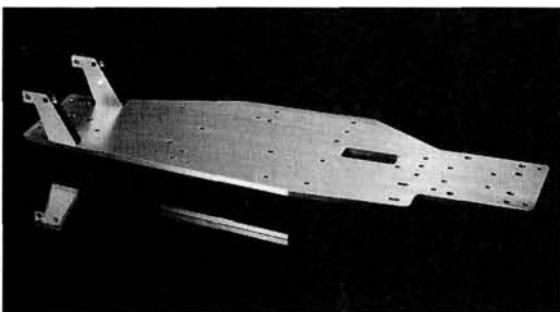
## TRINITY Airtronics Caliber Rechargeable Battery Pack

This new, 9-cell rechargeable battery pack is rated at 10.8 volts; the Caliber is designed to run on 8 alkaline cells (12 volts); currently available packs offer only 9.6 volts. This new pack rivals the voltage level of alkalines, and it will last longer between charges and provide more range and less glitching. The pack can be installed in seconds; it fits in the regular battery

space and plugs right in.

**Part no.—RC5559; price—\$55.99.**

Trinity Products Inc., 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.

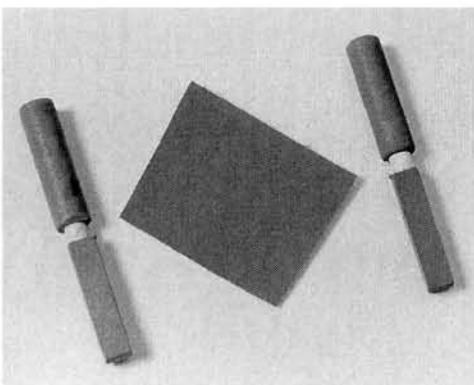


## RACE WORKS RC10GT Chassis

Made of T6 aluminum, this light, rigid chassis is flat, so it doesn't flex, and it's easy to clean. It features: a front post support (FPS) system, which eliminates tweak and allows the wheelbase to be completely adjusted; an enlarged flywheel cutout for easy hand-held starting; and countersunk screws for a low-drag advantage.

**Part no.—RW 1001; price—\$49.95.**

Race Works, P.O. Box 4261, W. Richland, WA 99353; phone/fax (509) 967-2428.

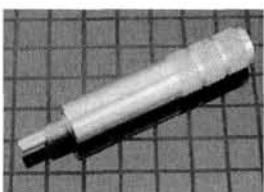


## DYNAMITE Piston Locking Tool

This red-anodized, aluminum tool screws into the glow-plug socket on your engine, effectively holding the piston and crankshaft in place to allow easy removal of the clutch, clutch nut and flywheel.

**Part no.—DYN2512;**  
**price—\$7.95.**

Dynamite, dist. by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

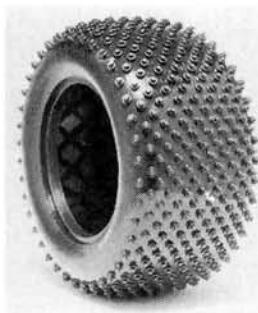


## MOTOR MAN Commutator Cleaning Kit

The kit comes with two comm sticks; the red is abrasive for cleaning, and the blue is fine for polishing. It also includes an emory cloth (for cleaning the sticks) and instructions on how to properly clean a motor.

**Part no.—MM1320; price—\$7.**

Motor Man; distributed by Hobby Warehouse of Sacramento, 8950 Osage Ave., Sacramento, CA 95828; (916) 381-7588; fax (916) 381-7589.



PRO-LINE

### **Truck Step-Pin**

This duplex step-pin truck tire is perfect for loamy to medium track conditions. Designed to fit 2.2-inch rear truck wheels, these tires feature a round carcass and tight step-pin design, and they're available in soft XTR and super-soft M2 compounds. They're also available in 2.15-inch buggy size.

**Part nos. and prices—\$897 (XTR) and \$897M2, rear truck, \$17.95; \$8087 (XTR) and \$8087M2, buggy, \$12.50.**

Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

TAMIYA

### **Ford F-150**

This 1/10-scale, 4WD truck features: a race-proven, modified TA02 chassis; rugged steel driveshaft; sealed gearboxes with differential gearing; independent, double-wishbone suspension; long, coil-over, oil-filled shocks; and a fully detailed polycarbonate body with a skidplate bumper. The kit comes with a 540-type motor and a 3-step forward/reverse mechanical speed control.

**Part no.—58161; price—\$236.**  
Tamiya America Inc., 2 Orion, Aliso Viejo, CA 92656-4200; (800) TAMIYA-A; fax (714) 362-2250.

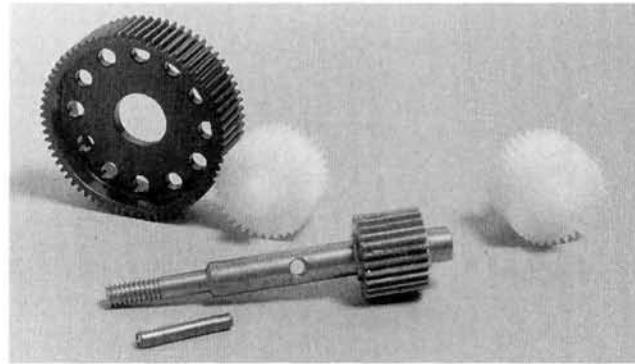


THORP MFG.

### **64-Pitch RC10GT Gear Set**

This set was designed to replace the stock gears and to make the diff smoother. The diff gear is machined out of hard-anodized aluminum, the idle gear is machined Delrin, and the top gear and shaft are machined steel.

**Part no.—4785; price—\$40.**  
Thorp Mfg. Inc., 4054 E. Mission Blvd., Pomona, CA 91766; (714) 622-6516; fax (714) 622-2947.



SCHUMACHER

### **3-Spoke Truck Wheel**

Made to fit all the Storm 2000 series trucks and the Viper, these durable wheels are made of 5-percent-fiber-reinforced, white, dyeable plastic. Also available to fit Team Losi and Associated trucks.

**Part nos.—U1852 (front), U1853 (rear); price—\$7.95/pair.**  
Schumacher USA, 6302 Benjamin Rd., Suite 404, Tampa, FL 33634; (813) 889-9691; fax (813) 889-9593.

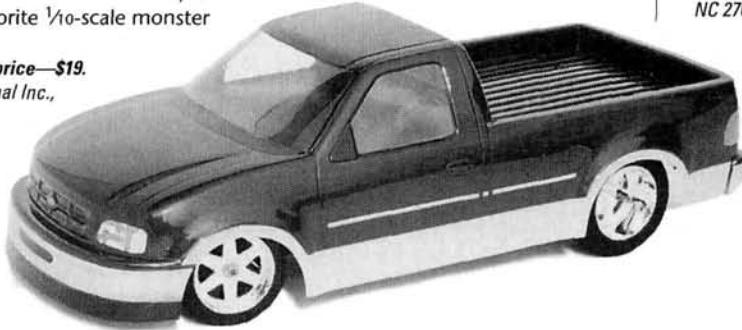


PARMA

### **1/10-Scale '97 Ford-150**

With permission from the Ford Motor Company, this R/C truck body was released before most new full-size truck dealers even had a chance to see it. It will fit all the Parma Good Times chassis kits, and it will fit your favorite 1/10-scale monster truck.

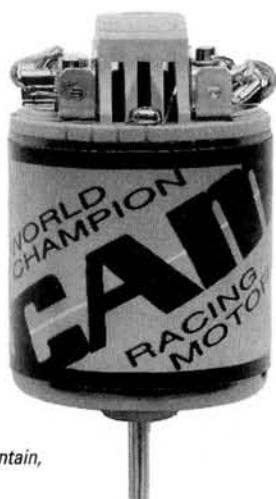
**Part no.—10204; price—\$19.**  
Parma International Inc., 13927 Progress Pkwy., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



### **PTI Cam Motors Modified Vortex**

This modified motor is hand-wound, epoxied, balanced and trued to the strictest specifications. A variety of winds is available, including custom winds.

**Part no.—VOR-00TD; price—\$90.**  
PTI/Hyperdrive, 331 Shellybrook Dr., Pilot Mountain, NC 27041; (800) 333-1375.



Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by **Radio Control Car Action** or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in **Radio Control Car Action**. Manufacturers! To have your products mentioned here, send press releases to **R/C Car Action**, What's New, 251 Danbury Rd., Wilton, CT 06897.



## GETTING STARTED

by Brian Leslie

# Choosing the Right Radio

**C**HOOSING A RADIO that's right for your skill level is just as important as choosing the right car—and just as confusing. This month, I'll cover entry-level radio systems and some of their key features.

### SAVVY SYSTEMS

Futaba\*, Airtronics\*, Hitec/RCD\* and JR Remote Control\* produce top-quality, well-proven 2-channel AM radio systems; most include a transmitter, a receiver and two servos (one per channel). Some that deserve a closer look are the Airtronics Rival RV2PS Sport, the Futaba Magnum Sport 2PB, the Hitec Challenger 260 and the JR Python. They all cost less than \$70—some less than \$60, if you shop around. With proper care, these systems will last a long time and provide you with hours of trouble-free fun.



**This Futaba Magnum AM is one of the more high-end, entry-level radio systems. It's always a good idea to buy a radio with as many features as your budget allows.**

### STICK AND PISTOL-GRIP RADIOS

There are two types of radio—stick and pistol-grip. Pistol-grip radios are shaped like a gun with a "trigger" that controls throttle and braking. A wheel on the side of the transmitter controls steer-

ing and can sometimes be adjusted for left- or right-handed driving. The pistol radio is preferred by many R/C car drivers because it's comfortable to hold and well-balanced. The stick radio is box-shaped and has two evenly placed sticks; the left stick controls the throttle, and the right stick controls steering. Stick radios are mostly used to fly R/C planes and helicopters.

### CHOOSING A CHANNEL

The FCC regulates the frequency bands allowed for air and surface use. It's up to you to decide on which channel you want to transmit your signals. Cars and boats can transmit on 27 band (26.995mHz to 27.255mHz) and 75 band (75.41mHz to 75.99mHz). Make sure you choose a channel that none of your friends or fellow racers are on; if two of you are on the same channel, you'll have problems. Buy an extra set of crystals on a different frequency when you buy your radio,

especially if you see racing in your future.

### RADIO FEATURES

Most starter radios have similar features; the following are found on the systems mentioned above:

- **Two channels.** This means the transmitter sends two channels of information to the receiver—one for throttle and braking and one for steering.
- **Servo-reversing.** This allows you to reverse the servo action, e.g., if your car turns right when you turn the steering wheel left, you definitely need to reverse the steering-servo action.
- **Steering trim** allows you to align the steering servo, e.g., if your car veers to the left when it should go straight, use



**The Airtronics Rival RV2P radio.**

this adjustment to straighten it out.

- **ATV—adjustable-travel volume.** This lets you set a maximum range of servo



**The JR Propo Beat 2 Alpina and JR's newest entry-level radio, the Python.**



Two stick radios—the JR Beat Gear and the Futaba Attack III.



travel. For example, if you don't want the servo to travel 100 percent to the right and left, set it to travel between 10 and 100 percent in both directions. This comes in handy when you set the throttle and brake controls, but it's not absolutely necessary.

- **Dual rates** allow you to reduce servo travel. This can make your car or truck less sensitive to abrupt steering movements. Beginners have a tendency to oversteer, over-brake and over-everything. This adjustment smooths out these actions.

#### OPTIONAL RADIO FEATURES

- **BEC circuitry** allows the receiver unit to be powered by the same battery pack that powers the car. This eliminates the need for extra batteries.

- **Battery indicator.** This indicates battery-voltage levels in the transmitter. Some units even have a battery alarm that warns you when the voltage is dangerously low.

- **Tension control** for the steering wheel and throttle trigger. This helps you fine-tune the tension to your liking.

Hitec offers a unique feature that is very useful—an anti-break steering wheel. If you turn the wheel past the "stop"

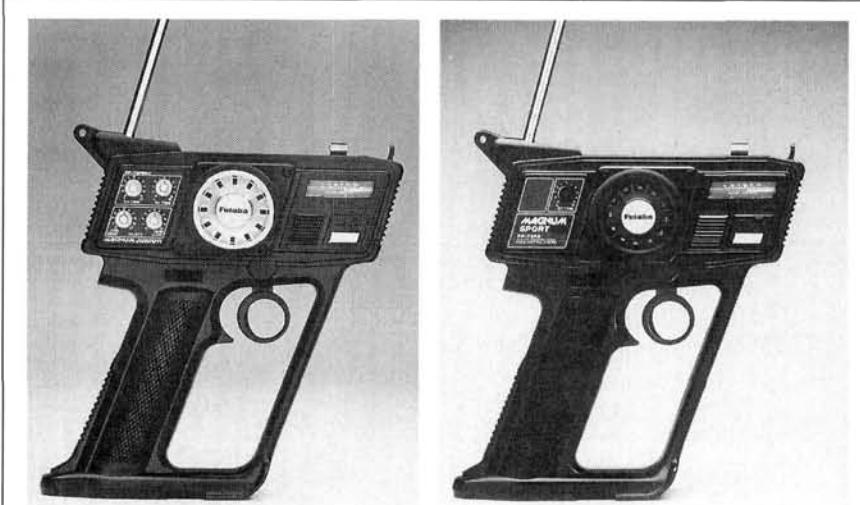
point, you won't shear off the stop mounts inside the unit; most beginners nearly twist the wheel off when they first learn how to operate an R/C car.

shorten your transmitting range. This also means that you should not roll the antenna up into a ball and lay it in the bottom of the chassis; it should never overlap itself. Use the antenna tube supplied with the R/C kit. If you must coil excess antenna wire, use a proper loom.

- Mount the receiver as far away from the motor and speed control as possible. This will help to prevent unwanted electrical motor noise from interfering with the transmitter signals. Try not to mount the receiver on an aluminum or graphite chassis, because these materials may act

need to enhance your system. For three years, I used a Futaba Magnum Jr. for electric cars and gas-powered trucks with excellent results. I then moved on to a more sophisticated FM radio system. As my skills improved, I bought faster servos. All the manufacturers listed above sell servos that come in different speeds and prices. Usually, the faster the servo, the higher the price.

When you shop for servos for off-road trucks, keep one rule in mind: the servo should produce more than 40 oz.-in. of torque. Turning large, heavy truck wheels is tough work, and it



Two of Futaba's most popular entry-level systems—the Magnum Junior and the Magnum Sport.

#### RADIO INSTALLATION TECHNIQUES

When it's time to install your new radio system, keep these key things in mind:

- Do not shorten or lengthen the receiver antenna. The length of the antenna wire is tuned to the transmitter frequency. If you change its length, you'll drastically

as an antenna and conduct noise. When you run gas-powered vehicles, wrap the receiver in a plastic bag to prevent fuel from getting inside the circuit board. Use tie-wraps to keep all the servo wires neat and tidy.

#### WHEN TO UPGRADE?

As your skills improve, a faster servo is all you'll

require a powerful servo. For buggies and on-road cars, less than 40 oz.-in. is fine.

I hope this helps you make that ever-so-important, first radio purchase. Once you have that under your belt, experience and time will tell you what is best for you next.

\* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

## Tekin Rebel

**T**HIS MONTH, my target for testing is Tekin's\* Rebel electronic speed control (ESC) with reverse, and when it arrived, I got right down to "scoping" it out. The instruction book told me all I needed to know, and the transmitter adjustment chart is an especially nice touch. It lists most of the popular transmitters by model number, and it gives the switch settings that will provide the smoothest throttle response.

Even though it's reasonably priced, it doesn't lack the necessary features. Check the "What it Has" box for a complete list. Reverse delay protects the gears by letting the vehicle come to a stop before it slams into reverse, and high-

frequency motor control smoothes operation, and that's less brutal on the transmission.

Of course, I had to look inside (I don't recommend that you do this); no surprises—rugged construction that's typical of what we expect from Tekin. The FETs lie flat and are bonded firmly to the massive heat sink—great for heat dissipation, and it also makes a very rigid assembly that should stand the pounding we hammer-handed drivers tend to dish out.

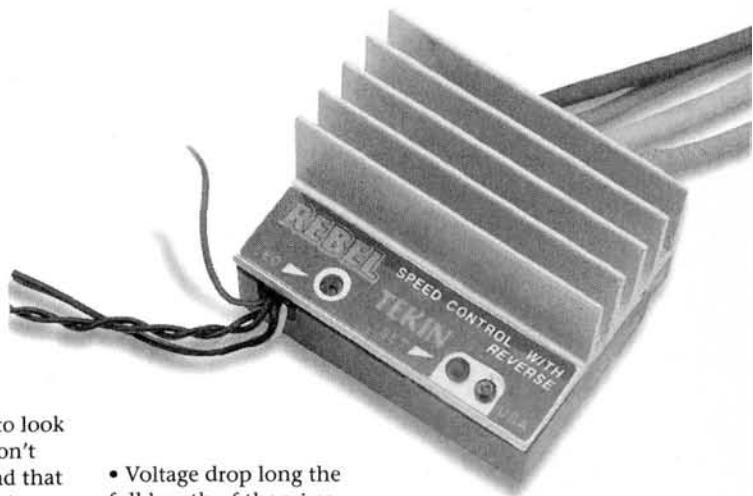
### LAB LABORS

#### TEST 1— RESISTANCE

ESCs with reverse tend to have higher "on" resistance than racing controllers. This is because the FETs are divided into two groups—one for forward and one for reverse—and this effectively doubles the resistance.

With 12 amps of current flowing, I measure the voltage drop across the ESC and then calculate its "on" resistance by dividing the measured voltage drop by 12. I measure resistance twice—along the full length of the motor wires and battery wires (including connectors) and 2 inches along them. The first reading helps me to determine an ESC's resistance as it comes from the factory, and the second gives a standard reading with which I compare ESCs.

**this  
one  
gets  
“two  
thumbs  
up!”**



- Voltage drop long the full length of the wires (including connectors): 0.37 volt—a resistance of 0.031 ohm.

- Voltage drop 2 inches along the wires: 0.25 volt—a resistance of 0.020 ohm.

These resistance figures are about average for a reversing ESC, but the Rebel's massive heat sink should keep it cooler than most with similar resistance figures.

#### TEST 2— OVERHEATING

I "cook" every controller test by adjusting the resistor bank to pass 20 amps of current, jamming the throttle wide open and running the ESC for 15 minutes while it pumps a hefty 20 amps.

Of course, the heat sink was in place, but I didn't provide any cooling air (no fans allowed). This is the equivalent of three or four back-to-back battery-pack dumps with the ESC buried so deeply in a car that its heat sink isn't being air cooled.

After 15 minutes, the Rebel was so hot that it was impossible to hold its heat sink, but it was still operating normally, and after I stopped the current flowing, the heat sink cooled off very quickly. Tekin and I agree that the Rebel can handle any motor and gear combination that yields a 4-minute dump time (or longer). This includes all

stock and modified motors down to 16 turns.

### ROLLING WITH THE REBEL

This time, my test bed was a 10-year-old Marui Big Bear—probably one of the very first R/C monster trucks to hit the market. It was still in good working order, but before running it with the Rebel, I had to rectify a few shortcomings (clean the motor, etc.).

Pre-installed connectors make it easy to install the Rebel, and the Big Bear had more than enough room for it. Also there was plenty of room on the rear deck of the Big Bear to mount the Rebel.

When I first tried to operate the Rebel's one-button programming, I could not get it to work, so I re-read the instructions to find out what I had been doing wrong. I had been releasing the program button too soon. The trick is to be patient; 10 seconds might seem like forever, but you must wait until the LED starts flashing. After that, advance the throttle to full forward and then to full reverse, and then let it return to neutral. Wait about 5 seconds for the LED to stop flashing, and the Rebel and your transmitter will be perfectly matched. This system works especially well with budget-price transmitters.

### WHAT IT HAS

- Programmable reverse.
- High-frequency motor control.
- One push of the setup button matches controller to transmitter.
- Four FETs (two for forward, two for reverse).
- Built-in BEC.
- Built-in pulse monitor/programming LED.
- Massive, built-in heat sink.
- Factory-installed motor/battery connectors.
- Tekin's Universal Radio Connector System.
- Programmable reverse delay, which can be deactivated for racing.

**Of course, Tekin didn't forget to include a really good instruction book, decal sets, cable ties, motor capacitors and mounting tape.**



# Modifieds

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Prep has  
been building

**Modified Racing Motors  
for 12 years and building a  
racing record with State and  
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high quality of our Stock Motors  
was generated directly from our  
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you've seen how fast Powerzone  
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 #RP-905-102—Ten turn big wire double. \$85.00  
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 All motors include the Dyno sheet and a FREE Motor Tube.



**Complete kit for breaking-in a  
motor. The battery pack powers  
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the fan cools the motor and also  
adds a load to the motor for  
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Makes a great work station for  
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Break-in Kit without batteries.**

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that do not have endpoint settings and channel-reversing switches.

Then I headed for some pavement. Right from the first advance of

to come by, so I curbed my enthusiasm and toned down my test—impressive performance without transmission-jarring jerks.

## SPECIFICATIONS

### DIMENSIONS

Height .....	1.16 in.
Width .....	1.45 in.
Length .....	1.82 in.

### WEIGHT

(w/wires and heat sinks) .....	2.5 oz.
--------------------------------	---------

### TUNING

Access to controls .....	Good
Ease of adjustment .....	Good

### PRICE

List price .....	\$129
Warranty .....	120 days

### ELECTRICAL (manufacturer's specs)

Max. voltage .....	10 cells
Min. voltage.....	4 cells
Rated current.....	Unlisted
Resistance .....	0.006 ohm

### TEST PARAMETERS

Voltage .....	6 volts
Current .....	12 amps
Voltage drop —along full length of wires .....	0.37 volt
—2 inches along wires .....	0.25 volt

### Calculated resistance\*

—along full length of wires .....	0.031 ohm
—2 inches along wires .....	0.020 ohm
BEC output, 6-cell battery .....	5.05 volts

\*Resistance = Voltage drop ÷ Current

**COMMENTS:** an ideal replacement for a burned-out mechanical controller; unique, extruded-aluminum heat sink—excellent heat dissipation; reverse delay of 0 to 4 seconds, and reverse can be turned off—great for races at which reverse is prohibited.

the throttle it was obvious that the restoration project had been a roaring success. The Big Bear charged away with a vengeance. I jammed the throttle between reverse and forward; the Big Bear actually popped a wheelie. But I was driving an antique, and transmission parts would be hard

After the first run, the Rebel's heat sink was barely warm, even though the Big Bear is a heavy truck and places a heavy load on the motor. The Rebel ran much cooler than the mechanical controller that it replaced.

On the next run, I played with the reverse

delay, which can be set for 0 to 4 seconds or turned off completely. To set this delay, just press the program button and release. A quick press sets the delay to zero. This permits wheel-sliding, wheelie-popping bolts between forward and reverse (fun, but not good for transmissions). Holding the button down for 1 to 4 seconds will give a 1- to 4-second delay; hold the button down for more than 4 seconds, and reverse is disabled. I like the 4-second delay because the brakes work during the delay time, so you can be driving flat out in forward and still be able to brake for sharp turns without having reverse kick in. But if you get your ride stuck nose first against a solid object, a 4-second wait is all it will take to get you out of trouble.

The programmable reverse is probably one of the Rebel's most interesting features. It's great for drivers who want an ESC for both backyard jamming and racing. Most organized races don't permit reverse, but with the Rebel, you can dial it out to make it legal.

The controller did get quite warm during my "let-it-cook" test, but in actual use, it stayed very cool. The Rebel should be able to handle any motor/gear combination that provides a 4-minute run time (or longer). This surely includes all stock motors and most modified motors.

As they say in the movie industry, this one gets "two thumbs up!"

\*Addresses are listed alphabetically in the Index of Manufacturers on page 168.



# Magic carpet-tuning tricks

THE INDOOR RACING season was a real learning experience for me last year, because I was racing at an unfamiliar track. Although the Formula 1 class has been popular in this area for several years now, the

HPI\* chassis that I decided to use last season was totally different from any other car I had ever tried to tune or drive. The good news was that the past year was also successful: I finished third in the points series, I didn't

break any expensive parts, and I had a great time with a neat bunch of fellow racers at the track.

The following tips apply not only to F1 cars and HPI cars in particular, but also to any on-

road car you may be running indoors on carpet. Wherever possible, I've tried to translate what I've learned into information that will be useful to  $\frac{1}{12}$ -scale newcomers,  $\frac{1}{10}$ -scale hot shoes, or indoor sedan runners.



**The stiffness of a spring is largely determined by the thickness of its wire.**

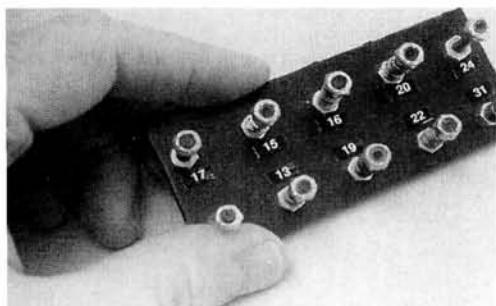
## FRONT-END STUFF

Almost every on-road car, whether F1,  $\frac{1}{12}$  or  $\frac{1}{10}$  scale, uses a very simple front-suspension system. Usually, this consists of some sort of spring-over-kingpin design, where a short, small-diameter coil, e.g., part of a ballpoint-pen spring, slides over the steering kingpin. As the front wheel, steering spindle and kingpin bounce upward in response to bumps and imperfections in the track's surface, the spring forces this assembly back down. The strength with which the spring rebounds is determined by the thickness of the spring's wire. Have you ever thought about how stiff your front springs really are? Borrow an accurate set of digital or dial-gauge calipers, and measure the thickness of the spring wire; it allows you to rate the springs you have according to stiffness.

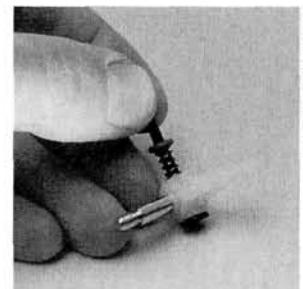
I used to have a bunch of springs just rattling around in one of my parts boxes, and I would guess which ones were stiffer by squeezing them between my thumb and forefinger. Thanks to one of the pit tips in *Car Action*, I got the idea for this spring holder that helps me keep track of which ones I have on the car and what options are available to me. It's made out of a small square of

Kydex (Lexan or fiberglass would work, too) and a dozen, long 4-40 bolts, nuts and locknuts. The labels came from a Paragon\* pinion rack, but you could also cut numbers from an Autographics\* labeling sheet. Note that there's only one pair of springs on each post; the empty post tells me which pair is mounted on the car. It's simple, and it works!

It takes a while to learn how to change front springs quickly, but once you see the results, you'll become motivated to do it more often. You'll be amazed at how differently the car handles when it's equipped with softer or firmer front springs. Now you'll be able to tune out that chatter through tight, high-speed turns, or make the car track more easily down the front straight. Can I actually feel the difference between .019s, .020s and .021s? I can't, but the clock can!



**Make a spring rack, and label the spring-wire diameter for reference.**



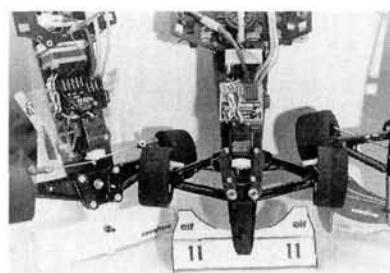
**See how the O-ring grips the kingpin as it moves up and down? Damping!**

PHOTOS BY DOUG MERTES

## SPRING INTO ACTION

You may also notice that there's a difference in the uncompressed length of springs made by different manufacturers. To work properly, springs need to fit without excessive preload. You'll have to give them as much vertical travel space as possible, and then shim them to the correct preload height with spacers or thin washers. That takes a little thinking, because each car's front suspension design is a little different. Don't try to make the space between the upper and lower arms any larger; instead, make the steering spindle itself a little thinner. You may be able to cut the little bump off the top of the spindle (like the Kyosho Impress part), shave it down (like the Tamiya or Associated piece), or substitute a similar part made by a different manufacturer for the one that's on your car. Check the parts wall at your hobby shop, and be creative!

With a little extra vertical breathing room for the kingpin, you may also be able to fit a small red or black O-ring between the spring and spindle. Along with some silicone shock fluid (heavy weights work best), or Trinity's\* Purple Stuff damper lube, this will provide some damping action. The O-ring grips the kingpin shaft as it passes through it, so you'll need to place it between the spring and the suspension arm. Here's another idea: stop by the local machine shop, and see if you can get some thin, scrap Teflon sheet (a couple of square inches is all you'll need). Tecnacraft\* also sells it to apply to damping washers. Cut small washers out with a hole punch, and mount one below your steering spindle. This will relieve linkage binding where the spindle rubs against the lower suspension arm. Your steering will feel silky smooth, and it will stay that way much longer!

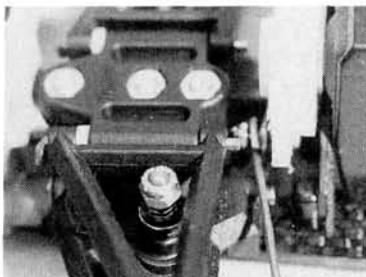


**These front suspensions use different designs, but they can all benefit from additional kingpin travel.**

## HPI OWNERS TAKE NOTE!

The HPI front suspension (both F1 and pan car) presents its own set of challenges: limited suspension travel, few available springs for tuning (they use really short ones), and a design that requires three teeny-weeny little hands to put the spring on the keeper, compress it and slide an E-clip into the groove on the pin. Unfortunately, I have big, fat fingers. Owners of HPI cars also have to do this on a regular basis, because the spring assembly is on the bottom of the suspension arms. It hits the carpet and pops off the clip every once in a while. You'll know it when that happens, because the front end will drag on that side, and you lose steering response in that direction. When it's working right, the suspension system is a

dream, but I was starting to get annoyed at the spring-pin design. That's when I called on my master machinist friend, Kevin Byrne. He was able to translate my less than accurate designs and descriptions into gorgeous stainless-steel parts with

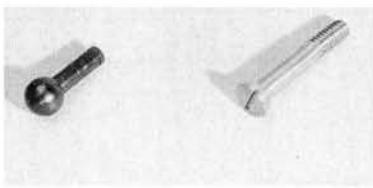


**Lots of travel and very easy-to-change springs!**

Once the ride height has been set, check the tweak. Tweak is a term used to describe the tendency of a car to steer more easily in one direction than the other, because there's more weight on one front or rear wheel than there is on the one on the other side. You can measure this very simply, and you don't need any special tools. Find a flat, hard, level surface (a pit table or hobby-shop counter does nicely), and

zero run-out.

I redesigned the spring pin so that instead of a ball that snaps into a socket in the upper arm and hangs down toward the carpet, it's a longer pin with a hemisphere (half a ball) machined onto the end, and it points up instead of down. It passes through a small Delrin ball that's inserted into the upper arm (just like the ones that pop into the outer ends of the arms) to provide the necessary pivoting action, and the spring is on the top of the pin instead of the bottom. Finally, we slotted the flat part of the hemisphere, and threaded the pin to take a 5-40 nut. It's easier to unscrew the nut and replace the spring than to remove and replace a clip. The nut also allows fine preload adjustments, and it will never, ever come off in a crash. The front end now has much more wheel travel, and I can dampen the action by using two black O-rings and a thin washer. I've really been happy with the results. If you don't have access to a machine shop, you could almost duplicate this by using a 4-40 flat-head machine screw. The spring may catch on the threads, but you may be able to smooth and polish the portion that the spring rides against without damaging the threads that you'll need to attach the nut. A guy in the F1 club I belong to did that, and he has been very happy with the results.



**The stock HPI spring pin is on the left; the modified part is on the right. Use a small Delrin ball (sold by HPI) to replace the original pin's ball in the upper arm.**

## TWEAK-O-TRONIC

place the car on it. The car must be loaded with a motor and a battery, and all of the wiring connections should be hooked up, just as if you were going to run the car on the track. Tap the center of the car a few times (the damping post is a good place) to simulate the attitude of the chassis as if it had just traveled down the front straight, bouncing a little as it went over bumps in the carpet. Now, lift

the center of the front bumper with the tip of a pointed hobby knife, and see which front wheel lifts first. If both tires don't lift at exactly the same time, you'll need to adjust the tweak screws (check your assembly manual) to give the car equal weight on both front tires. After getting the fronts right, you can turn the car around and check the rear tire as well.

## DRAGGING A LITTLE?

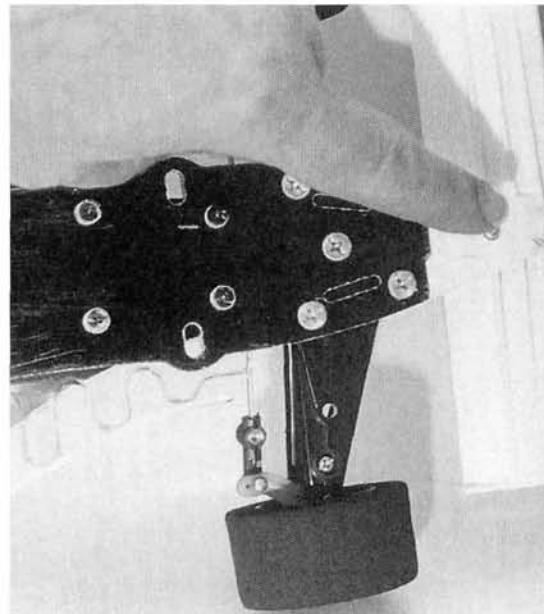
Lately, I've been noticing that many of the steering problems encountered by my fellow racers are related to ride height or the lack of it! If your car pushes very badly when entering a turn, or if it seems to run fine on the straights and very slowly through the turns, you may very well be dragging the nose of your car through the infield. One club member actually burned up a motor doing this!

Check to see if you have any carpet marks, smudges, or discoloration on the bottom of your car's chassis plate. Many cars, especially pan cars, use white nylon front bumpers, and these allow you to take an accurate

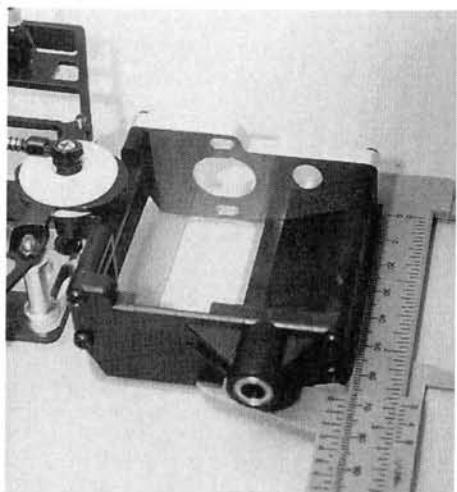
measure of suspension action. Clean off the bottom of the bumper or front wing with a rag dampened with lighter fluid or motor spray, and run a few laps. If the bumper or wing has black marks along the leading or side edges, you're rubbing on the carpet, and you'll need to raise the front end  $\frac{1}{4}$  inch or so. If you don't have a white bumper, try this: place some thin masking tape on the bottom of the bumper or chassis, and look for the same marks. Raise the front ride height, and I think you'll see a dramatic improvement in steering.

While you're checking the front end, it's

probably a good idea to make sure that the car's front and rear ride height are properly balanced. The general rule in limited-suspension cars is that the lower end does the steering. Because you'd much rather steer with the front wheels than with the throttle, make sure that the front end is a little lower than the rear end. With less sophisticated F1-type cars (without rear-axle ride-height adjusters), you'll have to make rear-height adjustments using different size tires. You may be able to juggle kingpin spacers up front in order to come up with the combination you need.



**Check the bottom of your chassis for carpet smudges or drag marks.**



**Is your rear pod straight and true? Check it and find out.**

Is it flat and square, and are all of the screws tight? Sometimes I find that putting the rear pod together with the T-bar separate from the chassis shows a bent or warped assembly. To correct this, loosen all of the screws that hold the pod together, and tighten them a little at a time as a friend holds the pod flat against a steady surface. If the rear pod uses an aluminum plate, check it to see if it's bent. Make sure that the motor wires from the battery and ESC don't make the pod shift to one side or limit

## REAR-POD DYNAMICS

movement. It's always a good idea to remove, clean and re-lube the damping washers (if your car has them) every couple of weeks, because carpet fuzz and tire dust tend to gather in there and make the pod-damping action inconsistent from run to run.

Speaking of damping lube, what are you using back there? I've tried BRP\* thick silicone lube, 70- to 100WT silicone shock fluid, plain old bearing oil and thick silicone diff lube. They all do the same thing, which is to control the rate of

side-to-side damping, but at different rates. How do you know if you need to change the fluid viscosity? If the inside rear wheel picks up in a hard, fast turn and unloads the differential, use a thicker fluid and more damping washer spring tension. If the car seems slow, ponderous and lazy through the infield sweepers, try using a lighter weight fluid. It's all a matter of experimentation until you discover the combination that makes you feel confident in your car's reaction to steering input.

## STOP TIME

The watch I use is made by Robic, but almost any decent digital stopwatch will do just fine. Try to find one that holds lap memories so that you can check a series of 5 or 10 laps in a row. You should be able to find one at a good hobby shop, a sporting goods store, or in full-scale racer supply catalogues. Learn how to use it, and teach a friend. You can time each other on the track, and find out whether you're really going faster or if it just feels that way.



**Get a decent digital stopwatch, and learn how to use it. Now you'll really know when you're going faster!**

## FEELING TIRED?

Have you tried different tire compounds? How about different brands of traction compound? This

is often a bench-racing debate topic where I race with people willing to try everything from very expensive exotic compounds to the least expensive foams they



**Tire-traction additive comes in a variety of formulas.**

can find. Fortunately for us, everything seems to work on the carpet we use; some just work better than others.

I had good luck with pink rears and red fronts, until I managed to chip

and scar most of the rubber away from the outer edges of the rear tires. I had a set of blue fronts and rears in the toolbox, so that's what I used the next week, and I wound up going two laps faster! Go figure. Another guy, who's the class of the field, uses purple rears and red fronts. I guess the old axiom that looser is faster still applies here. The less traction you can get away with, the less speed you will scrub off in the turns.

Don't hesitate to experiment with different brands of traction compound either. I always start with a full dose on the rear tires and a small strip on the insides of the front tires. I almost always put more compound on my rear

tires between heats, but I only apply more up front if I need additional steering. I frequently find that many racers have a difficult time with too much steering response, because they think they have to put traction compound on the full width of the front tires.

Part of the fun of R/C racing is figuring out the answers to problems you encounter every week, no matter what kind of car or truck you drive. Entry-level folks may just be trying to complete a full 4-minute heat without breaking;

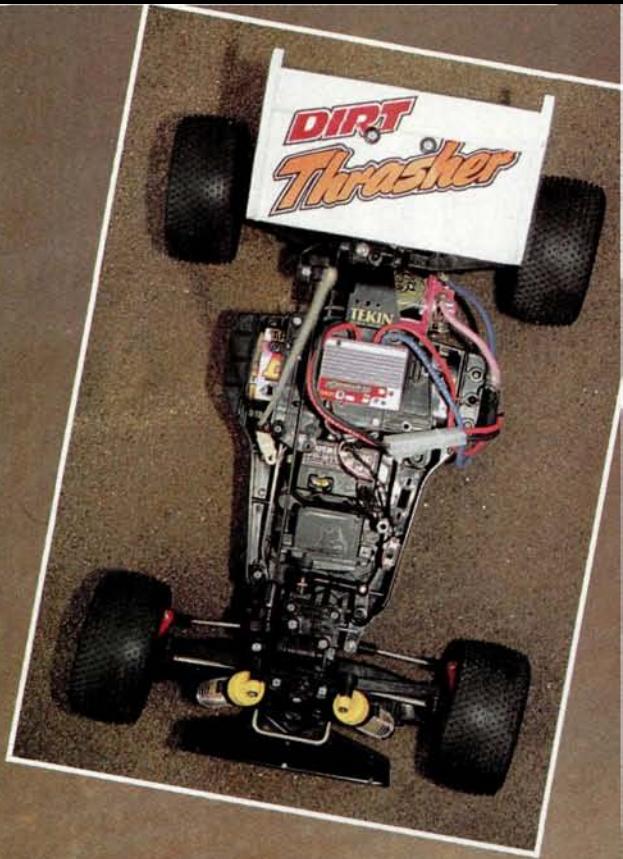
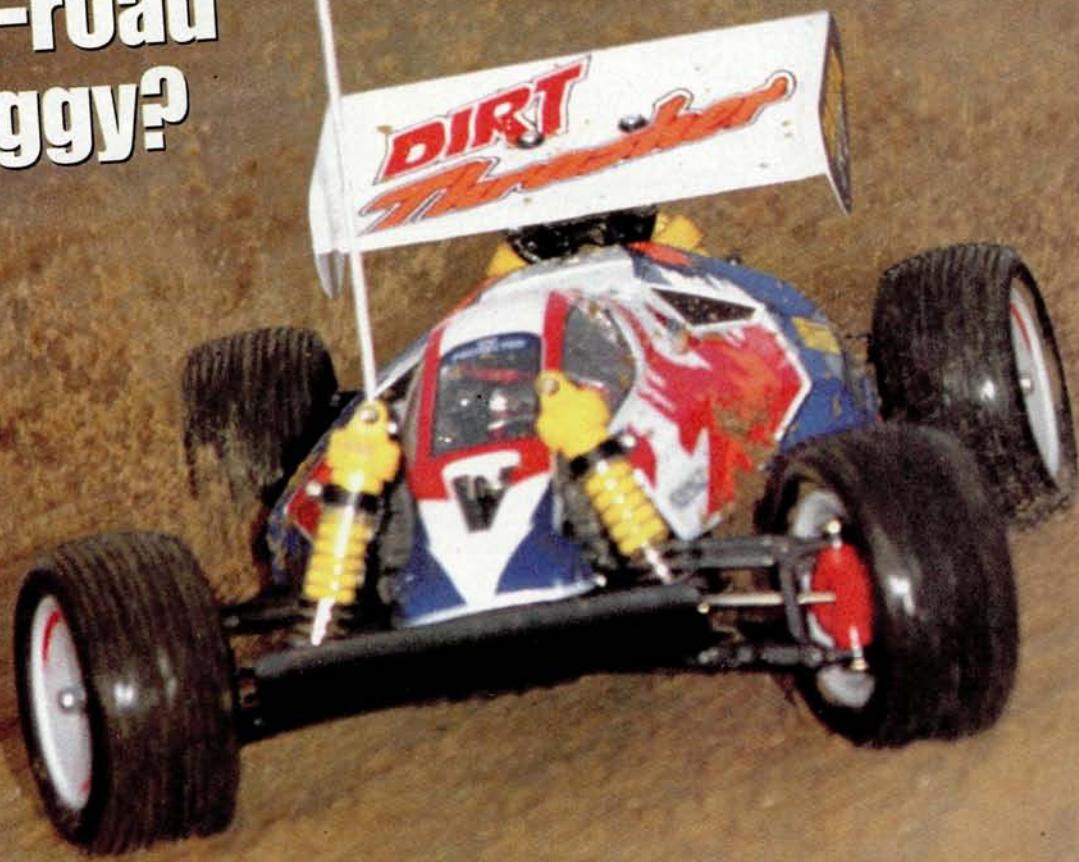


faster and more experienced racers are looking for ways to lose that elusive  $\frac{1}{10}$  second per lap. By thinking about solutions and watching what other drivers and tuners are doing to resolve their problems, you'll manage to accumulate quite a few tricks of your own. But don't ever think that you've heard it all or figured it all out. That's when some young whipper-snapper will blow right by you in the turns and leave you wondering, "What little trick does this guy know?"

\*Addresses are listed alphabetically in the Index of Manufacturers on page 168.

CAR ACTION  
**THRASH TEST**  
1/10 SCALE ELECTRIC

Should  
this be  
your  
first  
4WD,  
off-road  
buggy?



# Tamiya Dirt Thrasher

by Dan Haas

**S**O, YOU want to kick up a little dirt? Well, look no further! Introducing the Dirt Thrasher—Tamiya's\* newest offering in the  $\frac{1}{10}$ -scale off-road arena. With its low price and long list of hop-ups, the Dirt Thrasher can be both a durable backyard basher and a competitive off-road racer.

## KIT FEATURES

This was my first R/C car assembly, and I was amazed when I opened the box to find organized, labeled parts bags accompanied by a clear, concise instruction manual. The kit includes standard box and hex wrenches, diff lube, a 540-type motor and a forward/reverse 3-step mechanical speed control.

The Dirt Thrasher's molded chassis is based on Tamiya's old Manta Ray chassis, which is basically a modified TA01, and it's surprisingly stiff, so it should handle consistently and last a long time. The battery and radio tray are on the chassis center line, and the equal weights of the front and rear gearboxes balance the car's weight quite well.

The 4WD transmission includes two bevel-gear differentials (one in the front and one in the rear). Despite the transmission's complexity, it's amazingly simple to put together. Housed in sealed gearboxes, both differentials can easily be accessed by removing four screws. For the motor, Tamiya designed a plastic motor mount that properly aligns the pinion gear with the spur gear—an outstanding feature for beginners.

The Dirt Thrasher features 4W independent suspension with lower A-arms and upper molded links. Caster and camber are pre-set and aren't adjustable (another great feature for beginners). I was impressed by the quality of the four, molded, oil-filled, coil-over, large-capacity shocks. They were very easy to assemble and they don't leak—even going through all the rough stuff.

The kit comes with an unpainted polycarbonate body and a separate, molded, rear wing. Most Tamiya sedans come with window masks, but this one didn't. The supplied decals were difficult to put on, but spend a little time and patience on them;

give this  
car an "A+"  
in the  
performance  
department

- The kit includes six metal bushings and 16 plastic bushings. To reduce drag on the drive train, be sure to put plenty of grease on them. The Manta Ray

## BUILDING & SETUP TIPS

Ball Bearing Set (part no. 53073) is highly recommended for better performance.

- Before painting it, be sure to wash the polycarbonate body with soapy water; always apply the darkest colors first.
- I didn't run into any problems building this kit. The excellent instructions were easy to follow, and all the parts fit together perfectly.

## Things You'll Need

- 2-channel radio system.
- Two servos (or one servo and one for the speed control).
- Battery pack.
- Battery charger.
- Phillips screwdriver.
- Lexan scissors.
- Paint for the body.

## Factory Options

- Ball-diff set—part no. 53070.
- Torque-splitter set—53071.
- Ball-bearing set—53073.
- Stainless-steel propeller-shaft set—53079.
- 4WD stainless-steel suspension-shaft set—53098.
- FRP double-deck chassis set—53099.
- RS-540 sport-tuned motor—53068.

# SPECIFICATIONS

**SCALE** ..... 1/10  
**LIST PRICE** ..... \$198

## DIMENSIONS

Length (overall) ..... 15 in.  
Width ..... 9.75 in.  
Wheelbase ..... 10.6 in.

## WEIGHT

(Gross w/batteries) ..... 3 lb., 8 oz.

## CHASSIS

Type ..... Molded tub  
Material ..... Plastic

## DRIVE TRAIN

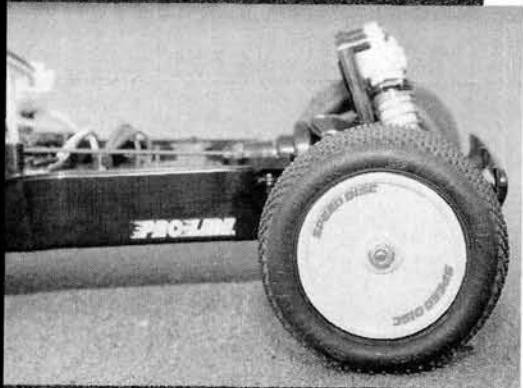
Type ..... Sealed gear drive  
Primary ..... Pinion/spur  
Differentials ..... Gear (F/R)  
Bearings/bushings ..... Plastic and metal bushings

## SUSPENSION (F/R)

Type ..... Lower A-arm with fixed upper link  
Damping ..... Oil-filled, coil-over plastic shocks

## WHEELS (F/R)

Type ..... One-piece plastic  
Dimensions (DxW) ..... 2.25x1.25 in.



A complete set of Pro-Line Flat Fuzzies in the new M2 compound transformed the Dirt Thrasher from mild-mannered buggy into a highly competitive racing machine.

**TIRES (F/R)** ..... Semi-pneumatic stubby

## ELECTRICS

Motor ..... 540 stock  
Battery ..... Not included  
Speed control ..... 3-step mechanical

## TAMIYA DIRT THRASHER

they sure look sharp! Mine also covered up a few of my painting mistakes.

### TEST GEAR

A Futaba\* Magnum Sport FP-T2PB radio and FP-R112JE 2-channel receiver controlled my new beast, while an Airtronics\* 94102 servo kept it pointed in the right

yard, where the Dirt Thrasher really cooked! 4WD really has its advantages. Steering response was excellent on dirt and on pavement. Coming off jumps, the car seemed to bottom out, so I filled all four shocks with Trinity 40WT oil, which helped out immensely.

Next stop was the Ranch Pit Shop\* in



**Tekin's new Formula 10 ESC, a Trinity Monster Stock Jr. 3 motor and Ex-Tech cells turned this buggy into a LearJet.**

direction. I shelved the mechanical speed control and installed a brand-new, budget-price, Tekin\* Formula 10 ESC, which will handle just about any modified motor (way to go, Tekin!). I started with the provided 540 motor, then moved up to one of Trinity's\* new Monster Stock Jr. 3 30-degree short-stack motors. A Sanyo\* 1400 SCR sport pack provided power, and a set of Pro-Line\* Flat Fuzzy tires give me the extra grip I need. (All the tracks here in Southern California have rock-hard dirt.)

Pomona, CA. The Dirt Thrasher handled well over the bumpy sections of the track; but because of my amateur driving ability, it did slide a bit going through the corners. Nevertheless, even though I'm not the greatest driver in town, the Dirt Thrasher made me look good, and it never spun out completely or went out of

control. Four-wheel-drive rules!

I did have some trouble getting over the jumps smoothly, though; the Thrasher tum-

### Likes

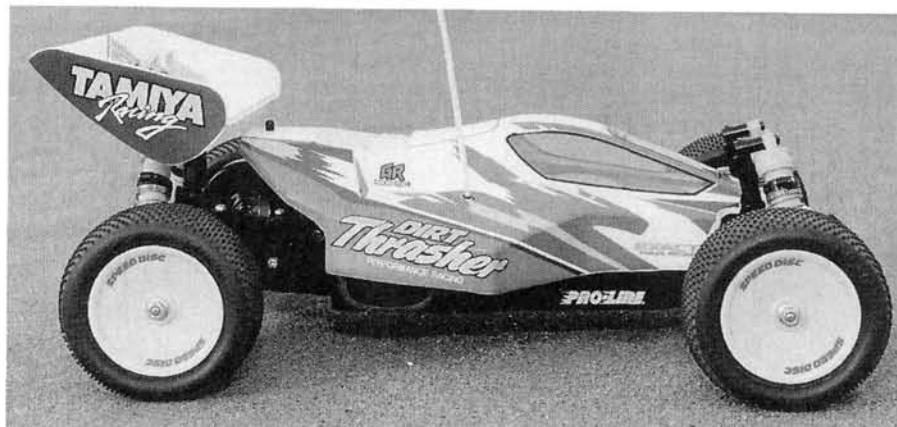
- Easy to build.
- Sharp detailing.
- Durable construction.
- Low price.

### Dislikes

- No window masks.

## PERFORMANCE

After about eight hours of assembling, I was ready to drive. I started in my front



Tamiya is world famous for its awesome-looking bodies. As you can see, the Dirt Thrasher is a prime example.

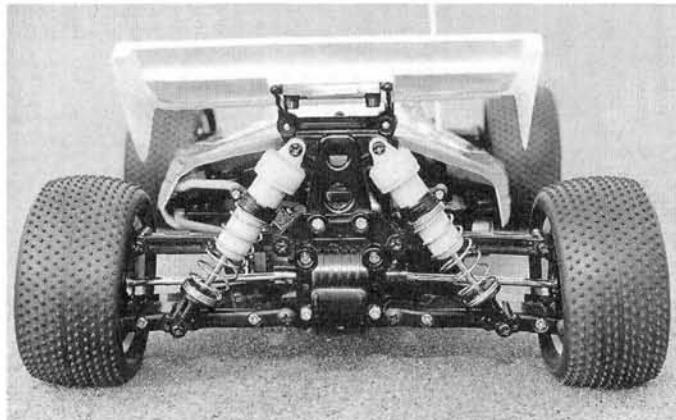


**Above:** up front, there's a set of Tamiya's legendary molded shocks with soft springs. It's amazing how well these shocks work. So what if they don't last as long as aluminum shocks? The shock bodies are inexpensive to replace.

## The Competition

	Kyosho* Lazer Alpha	Tamiya Dirt Thrasher	Schumacher Cat 2000 ECS
Wheelbase	10.7 in.	10.6 in.	11 in.
Width	9.4 in.	9.75 in.	9.5 in.
Weight	3.4 lb.	3 lb., 8 oz.	3 lb., 6 oz.
Dif type	Gear	Gear	Ball
Chassis	Kelon	Plastic	Fiberglass
List price	\$169.99	\$198	\$369.50
Available at*	\$129.99	\$119.99	\$221.70
Reviewed in	To come	4/96	To come

\*Prices vary with location.



In the rear, you'll find the same high-quality shocks as are used up front (only longer), extra-long suspension arms, a quick-access diff housing and a cool molded wing. The non-adjustable upper links are great for beginners, and they could very easily be replaced with turnbuckles.

bled through them instead of jumping over them. (I did say I'm an amateur, didn't I?) When I did hit the jumps just right, it was beautiful to see the buggy land on all four tires.

Overall, I was very impressed with the Dirt Thrasher's performance, and it managed to get through my "Thrash Test" unscratched. I give this car an "A+" in the performance department, and I recommend it to anyone who wants to have fun

with an easy-to-drive, off-road car.

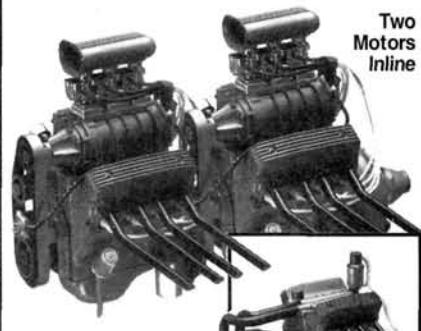
### FINAL THOUGHTS

In my book, the Dirt Thrasher is a definite winner—very durable, competitive, and with a wide range of hop-up parts to choose from. It was a joy to build, and it's a blast to drive.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 168.

# The Classic

*The Small Block Chevy V8 Engine Celebrates 40 Years!*

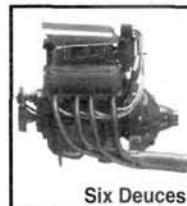


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# Small Block Chevy



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**THRASH TEST**  
 1/10 SCALE ELECTRIC



**HIGH TECH**

**without the high price**

**SPECIFICATIONS**

**SCALE** ..... 1/10  
**LIST PRICE** ..... \$249.50

**DIMENSIONS**  
 Length (overall) ..... 18.25 in.  
 Wheelbase ..... 10.5 in.  
 Width (F/R) ..... 9.25 in.

**WEIGHT** (gross, RTR) ..... 3 lb., 11.6 oz.

**CHASSIS**  
 Type ..... Double-deck  
 Material ..... Fiberglass

**DRIVE TRAIN**  
 Type ..... Belt-driven 4WD  
 Primary ..... Pinion/spur  
 Transmission ..... Molded, sliding drive shafts  
 Differential(s) ..... Ball  
 Slipper clutch ..... None  
 Bearings/bushings ..... Bushings

**SUSPENSION (F/R)**  
 Type ..... Lower A-arm, upper control link  
 Damping ..... Oil-filled, coil-over shocks

**WHEELS (F/R)**  
 Type ..... One-piece plastic  
 Dimensions (DxW)  
 —front ..... 1x2 $\frac{3}{8}$  in.  
 —rear ..... 1 $\frac{3}{8}$ x2 $\frac{3}{8}$  in.

**TIRES (F/R)** ..... Directional treads

**ELECTRICS**  
 Motor, battery, ESC ..... Not included



## Schumacher Bosscat 4WD Touring Car

by Derek Buono

**S**CHUMACHER\*—a leader in off-road racing technology—is stepping into the hot touring-car class with thumbs up and looking for a TKO. They've taken the potent Bosscat 4WD off-road buggy and mounted an Alfa Romeo touring-car body and some stylish three-spoke wheels on it. Get ready, America! This Euro-monster is one serious contender. So, if you've ever dreamed of owning one of the legendary Schumacher cars but didn't want to shell out the money, here's your chance. What are you waiting for?

### KIT FEATURES

The kit comes with a very rigid, double-deck fiberglass chassis. All the molded parts are of good quality and require very little hand fitting. The front and rear arms are long and look very sturdy, but I'd like to see shorter arms, which would narrow the car and allow a more scale-looking body. A full set of adjustable tie rods and front and rear ball diffs are also included.

The shocks feature Schumacher's Vari Pistons, which allow you to keep the same pistons in the shocks and change the number of holes. The shocks are hard-anodized and use double O-rings to ensure long life and prevent leaking, plus they feature Schumacher's unique, volume-compensating foam, which allows the shaft to fully enter the body without excess air in the shock.

My kit is the sport version, which includes bronze bushings, a motor and a mechanical speed control, but unfortunately, it doesn't include a slipper clutch, which would aid traction and reduce drive-train wear.

Assembled and ready to go, the car looks impressive. It is very low and looks as if it will make the transition from off-road to asphalt with ease. When I brought

it to a local track, the attention that it received was amazing. Everyone asked, "What is that?" and there were quite a few comments about the trick wheels.

### TEST GEAR

I recommend that you pick up a radio that has steering dual-rate adjustment so that you can dial out some of the steering; I installed an Airtronics\* Caliber 3P radio system. To steer the wheels, I used an Airtronics 94737 high-speed, high-torque servo. Peak Performance's\* *Wild Thing* 14-turn double powered the wheels, and some Dynamite\* Sport 1800s supplied the voltage. Finally, I installed Tekin's affordable 412-P Speedstar electronic speed control, which can handle modified motors and is affordably priced.

### PERFORMANCE

First, I gave it a full throttle blast to see how smooth the drive train was, and let me say *smooth* is an understatement. There's nothing quite like the sound of an efficient, quiet belt drive. By

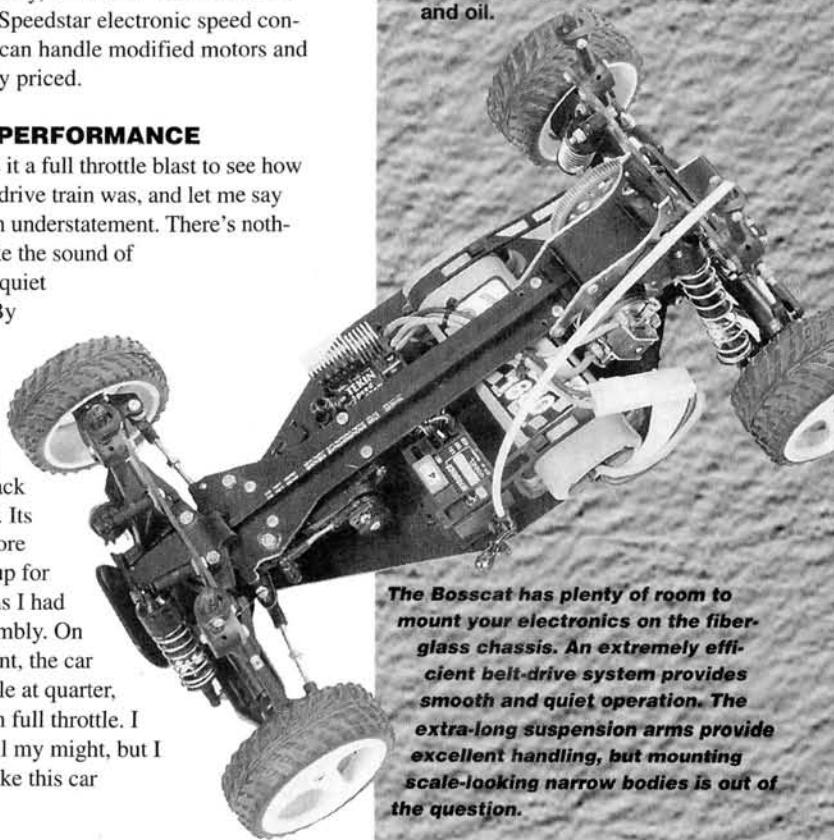
the time I was ready for the photo shoot, I had plenty of track time with it. Its handling more than made up for the problems I had during assembly. On dry pavement, the car is unshakable at quarter, half, or even full throttle. I tried with all my might, but I couldn't make this car roll over.

**T**he Schumacher Bosscat touring sedan is definitely a handful to build. The instructions could use a revision or two to eliminate the supplementary sheets. The lack of text was at times frustrating. Here are some tips that should save you some time.

- First, follow the directions and remember the supplementary sheets. At times, I was wrapped up in building and had to return to the same step and basically take the car apart and reassemble it correctly. If only I had remembered the supplementary sheets.

- The front sliders are oddly too long and bind during certain suspension/steering conditions. You need to cut them with either a Dremel tool or a small saw. The plastic is brittle, so don't try to use cutters.

- The front shocks contain Schumacher's volume compensation "foam-thing," and when inserted into the cartridge, the foam distorts the shape of the cartridge and makes it difficult to assemble the shock correctly causing the shocks to leak. Make sure that the cartridge is the right shape; it will save you a lot of time and oil.



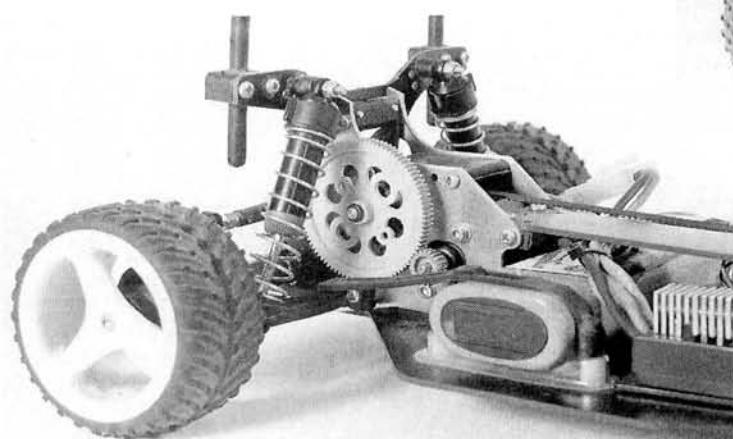
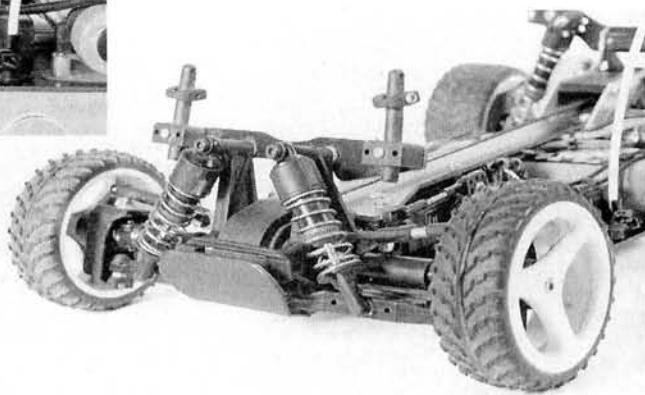
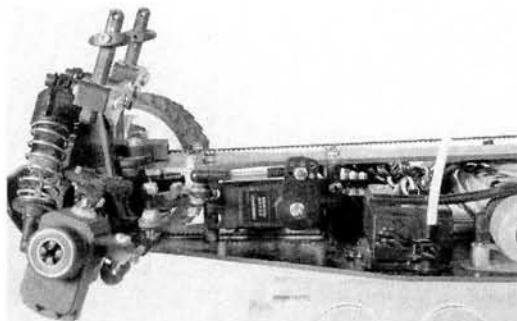
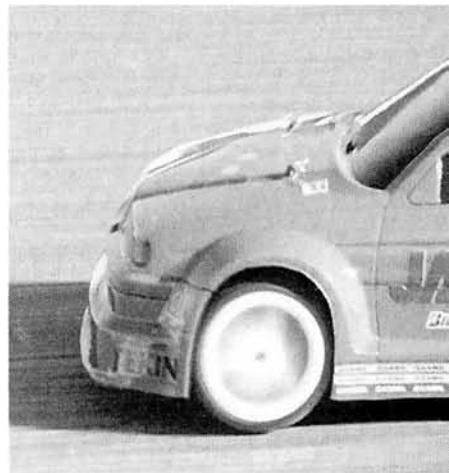
**The Bosscat has plenty of room to mount your electronics on the fiberglass chassis. An extremely efficient belt-drive system provides smooth and quiet operation. The extra-long suspension arms provide excellent handling, but mounting scale-looking narrow bodies is out of the question.**



## BOSSCAT TOURING CAR

The car has poor straight-line tracking because of a problem with the steering linkage. Extra clearance in some of the steering bellcrank parts causes unwanted steering slop. Careful assembly and a shim or two would cure this. The extra-long arms soaked up the bumps and made the decrepit Connecticut roads seem like the smoothest of highways. To think I said I wanted shorter A-arms—silly me.

**The drive belt travels directly below the battery and steering servo. The fiberglass upper deck acts like a "chassis backbone" to stiffen things up. An Airtronics 94737—an economically priced, high-speed servo—steers the car.**

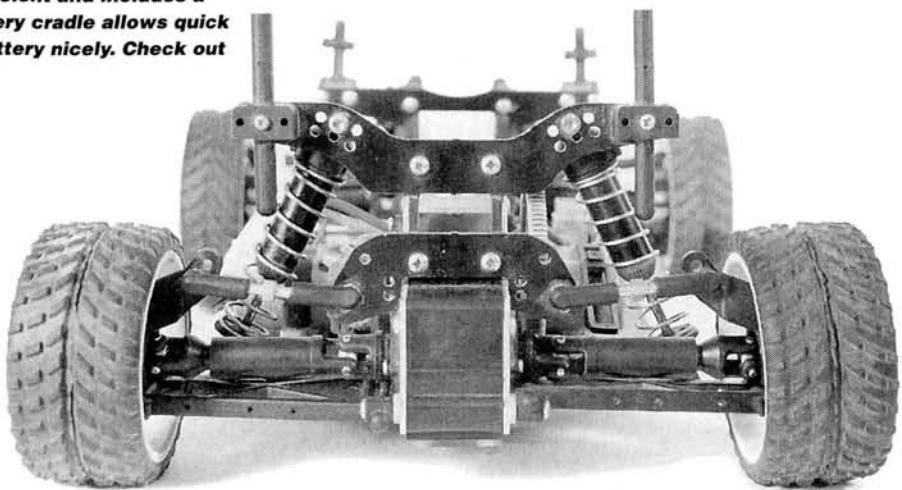


**The front end of the Bosscat is all business. Schumacher's legendary shocks with variable-rate pistons, universal sliders and a high-quality ball diff come standard. It's also equipped with Schumacher's Crash-Back suspension arms, which actually pivot when the car slams into a barrier; this system really works and will protect the suspension arms from most mishaps.**

**The Peak Performance 14-turn double is bolted onto an aluminum motor mount. The belt-drive tranny is very efficient and includes a pre-assembled, high-quality ball diff. The battery cradle allows quick and easy battery changes and secures the battery nicely. Check out the 3-spoke wheels—very cool.**

### Factory Options

- Layshaft—new slipper (part no. U1214).
- Ball bearing set—U1307.
- Ball bearing steering kit—U1376.
- QC slipper clutch—U1644.
- Front anti-roll bar kit—U765.
- Rear anti-roll bar kit—U766.
- Tungsten carbide diff balls—U816.



**In the rear, there's another ball diff in the tranny, a set of longer hard-coated shocks, universal sliders and adjustable tie rods. Check out the cool rally tires.**



## Likes

- Simply, the car handles. No if's, and's, or but's.
- The finished product looks sleek and menacing. It talks the talk and walks the walk.
- If anyone doesn't like the 3-spoke wheels, I want to know about it! Can you say "trick"?
- The efficient belt drive is ultra-smooth.
- The car offers a full range of adjustments.

## Dislikes

- The instructions could be simplified.
- The shocks are very tricky to assemble correctly.
- What happened to the stickers?

Basically, the car handled superbly, and aside from the steering slop, is fantastic in all respects. There's one big advantage to this car: you can do some serious hacking because it's big and wide, and it won't flip over. When it comes down to it, the car that's still on its wheels wins.

### FINAL THOUGHTS

This car looks a little out of place because it's so big, but who cares when it handles like it does? It could use some bearings and a slipper clutch to increase traction on slippery surfaces, but who cares? It effortlessly knocks smaller sedans off the track. This car is fun to drive, and it's more stable than the smaller Tamiya cars, because it's wider and longer. It's a handful to build, but the experienced should have few difficulties. The only gripe I have about this European king is the high maintenance; it takes a lot of work to stay fast, but...oh, well! When you want to dominate, you'll do anything.

\* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

## STOP PAYING TOO MUCH FOR "BATTERIES"

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6 CELL 294+ \$38.00 EA.	TRINITY 24* 36*	BRUSH CUTTER
6 CELL 300+ \$52.00 EA.	POINT BLANK 24*	PINION PAL
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4 & 7 CELL ALSO AVAILABLE	TRINITY SILVER	BATTERY TAPE
SANYO RECHARGEABLE "AA"	BUD HOLLOW	BUDS DIFF BALLS
SANYO N600 SCR CELLS \$3.50 EA.	NEW CAM #5812S & #6220L	EXCELL MOTOR SPRAY
SANYO N1000 SCR CELLS \$3.50 EA.	McLIN FIDDLE STICK	SCAT PRODUCTS "OIL"
SANYO N800 AR CELLS \$3.50 EA.	PRO-FIT AXLES	IRRGANG RACING PRODUCTS
4 CELL RECEIVER PK. \$10.00 EA.	PROFIT CAN OPENER	ULTIMATE DIFF ASSEMBLY
5 CELL RECEIVER PK. \$18.00 EA.	HIGH GRADE STAINLESS	DU-MOR SPUR & PINIONS
EDGE COMM STICKS	STEEL WHEEL BEARINGS	RACE PREP POWERZONE
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- TITANIUM PARTS**: mid trans shaft, dogbones, steering adj. rod set, upper arm adj. rod set, gearbox gear shaft.

## FULL SPEED RACING



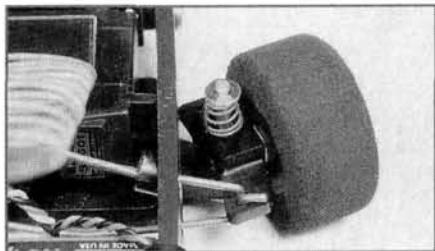
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BRP

# Super Oval Outlaws

by GEORGE M. GONZALEZ



**The front end features a coil-spring suspension that is similar to that on many on-road pan cars. The foam tires work great, and BRP has several compounds to choose from.**

**B**UD'S RACING PRODUCTS (BRP\*) recently introduced the Super Oval Outlaws—new and improved versions of the original Oval Outlaws. When I first caught a glimpse of these little R/C cars and trucks, I thought they were nothing more than a novelty, but when I built and drove one of them, I realized that they're quite sophisticated, and they offer many of the benefits of the more common  $\frac{1}{10}$ - and  $\frac{1}{12}$ -scale on-road vehicles.

#### KIT FEATURES

The new,  $\frac{1}{18}$ -scale Outlaws have a wider,

lower chassis plate, which provides more

flexibility for mounting the electronics. The front suspension arms are outfitted with a conventional pan-car floating king-pin/coil-spring suspension, and the rear end features a trailing-arm suspension that also uses coil springs for shocks; performance should be dramatically improved.

The chassis is made of Kydex, which is basically the same material that's used to make off-road bumpers, so it's unlikely that the chassis will crack or break. The chassis features two vertical side plates

that are secured to a lower chassis plate that serves as a wide radio tray that can hold a variety of electronics. The front of the chassis is secured to a front plate that houses the steering servo and front suspension.

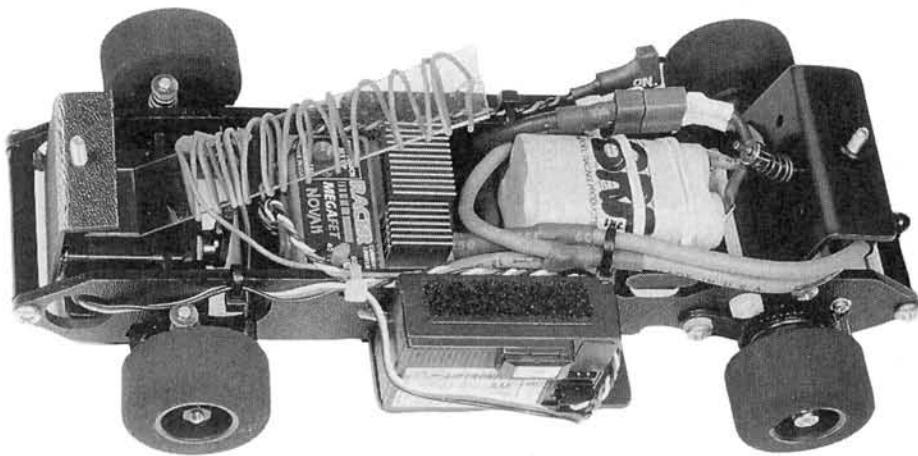
The rear end features a detached motor pod that has trailing arms at each side that are fastened to the main chassis and pivot on bushing-equipped screws. The suspension is nothing more than a couple of coil springs that provide fore and aft damping. Unfortunately, the only provision for side-to-side damping is the flexing of the chassis.

The Outlaws feature high-grip foam tires on all four corners, and BRP offers a few compounds for more tuning options. I was a little bummed about the wheels, because they aren't supported by bearings, or even bushings. They have a central hole that allows you to mount them on the axles, but only nylon locknuts support them.

The Outlaws come with either a stock-car body, or a cool-looking NASTRUCK body. I chose the truck body, and I was pleasantly surprised by the details. The body set comes with a two-piece roll bar and a separate spoiler, which makes the Outlaw look mean. There are several bod-



# Tiny but Mighty Desperado



**The Kydex chassis features side plates that form a nifty little tub. The Novak Racer ESC and Futaba 9601 servo fit snug as a bug in a rug. Even the large Airtronics receiver fits on the side plate—no problemo.**

ies to choose from, so you can dress up the Outlaw to mimic your favorite rides.

#### TEST GEAR

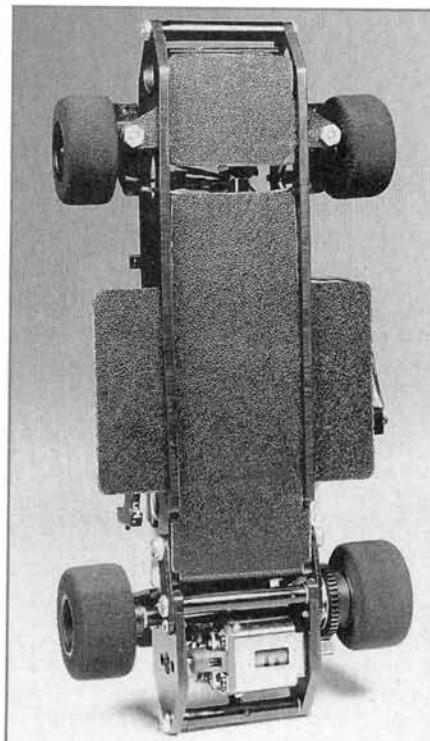
Even though the Super Outlaw Ovals are smaller than most R/C cars and trucks, they don't require small electronic components. Most receivers, servos and speed controls will fit, but if you plan to use a standard-size steering servo, you'll have to remove the mounting ears to fit it between the two chassis side plates. I decided to use a Futaba\* 9601 microservo that I had lying around, and it only needed a little trimming around the mounting ears. (The mounting ears remained intact, so I'll be able to use them on future projects.) For control, I used an Airtronics\* Rival 2P radio system; its rather large, 2-channel, AM receiver fit the lower chassis side plate with no trouble.

I also had a Novak\* Racer ESC lying around, so I mounted it on the lower chassis plate with servo tape. The Racer ESC is slightly overkill for this application, but it fit so well that I decided to leave it. BRP was kind enough to send a couple of battery packs along with the kit (a 4-cell and a 5-cell, 600mAh AA battery pack). A powerful Trinity Slotworks motor is also

included, and it definitely gets this little Outlaw motivated.

#### PERFORMANCE

The Super Oval Outlaws are compact, so you can drive them in tight places where 1/10- or 1/12-scale R/C cars and trucks would get claustrophobic. In fact, all you need is a 10x20-foot space, and you have a race track. Kitchen floors, patios, garages, basements and parking lots are all fair game for these little cars and trucks. You can also run them on indoor/outdoor-type carpet, but BRP rec-



**The chassis is made of Kydex—a rugged material that many off-road bumpers are made of.**

#### Things You'll Need

- 2-channel radio.
- 4- to 6-cell AA Ni-Cd battery pack.
- ESC.
- Battery charger with current adjustment capability, or a charger that can charge 600mAh 4- and 5-cell packs.

## Specifications

**SCALE** ..... 1/18  
**LIST PRICE** ..... \$69.95

#### DIMENSIONS

Length (overall) ..... 9 1/2 in.  
 Wheelbase ..... 5 7/8 in.  
 Width  
 —front ..... 4 1/4 in.  
 —rear ..... 4 3/8 in.

**WEIGHT** (gross, RTR) ..... 1 lb.

#### CHASSIS

Type ..... Vertical side plates with radio tray  
 Material ..... Kydex

#### DRIVE TRAIN

Type ..... Gear  
 Primary ..... Pinion/spur  
 Transmission ..... Direct drive  
 Differential ..... None  
 Slipper clutch ..... None  
 Bearings/bushings ..... None

#### SUSPENSION

Type ..... Kingpin/coil-spring (front); trailing arm (rear)  
 Damping ..... Coil-spring

#### WHEELS (F/R)

Type ..... One-piece plastic  
 Dimensions (DxW) ..... 3/4x5/8 in.

#### TIRES (F/R)

Foam

#### ELECTRICS

Motor ..... Trinity Slotworks  
 Battery ..... Not included  
 Speed control ..... Not included

## Factory Options

- Ball diff—part no. 355.
- Aluminum motor heat sink—435.
- 4- to 6-cell AA battery packs—440, 445 and 447.
- F/R tires in three compounds: orange—380 (F); orange—390 (R); blue—381 (F); blue (kit-supplied rubber)—391 (R); green—382 (F); green—392 (R).
- Eleven bodies, including a Porsche 911T—250; Ferrari F-40—253; Mercedes 190-E—251.

# Building and Setup Tips

The Super Oval Outlaws are very easy to assemble. The kit includes a two-page instruction manual that has a few illustrations and a full-size hardware identification photo. It's very well-written, but it could use more illustrations and photos—especially of the completed chassis. Here are some tips that might help you out.

- Use plenty of grease on the front and rear axles. The wheels aren't supported by bushings, so it's important to keep them well-lubed.
- Use some diff lube on the front-suspension kingpins. The steering blocks pivot on these kingpins, and smooth operation is critical for proper suspension operation. Trinity's\* Purple Stuff is excellent, and it provides supersmooth damping.
- Adjust toe-in/out by bending the piano-wire drag link, which is connected to the steering blocks. The out-of-the-box setup had way too much toe-in, so I bent the wire a little more, and that pointed the tires straight ahead.

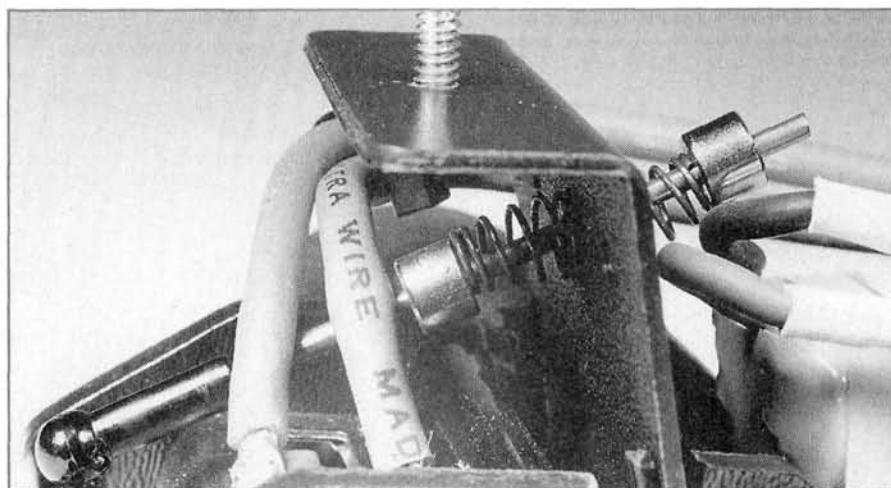
• To make my little Outlaw perform at its best, I installed the optional ball diff. But I noticed that the spur gear rubbed against the nylon 6-32 nut that secures the rear end to the main chassis. The optional ball-diff kit didn't include additional nylon spacers, which are needed for extra clearance. Luckily, I had extra nylon spacers in my toolbox. I only had to install one spacer on the left side of the axle, but for proper alignment, I had to install a spacer on the right side, too.

• If your ESC is too large to fit flat on the chassis, mount it on its side on the chassis side plate. If you find that your servo is too large to fit in the required location, even after

you've trimmed off the mounting ears, you'll have to get one that fits. The standard Futaba 148, or Airtronics 94102 will fit perfectly, and they're economically priced.

• For painting and detailing, use paint that's made for Lexan, such as Pactra\* R/C Paint. Parma Int'l.\* has many decal sheets for 1/24-scale slot cars, and they work well on the Outlaws. I used Parma's "Days of Thunder" decal sheet (part no. 757-A) and painted the body black, green and red to match the Mellow Yellow stock car that was used in the movie "Days of Thunder."

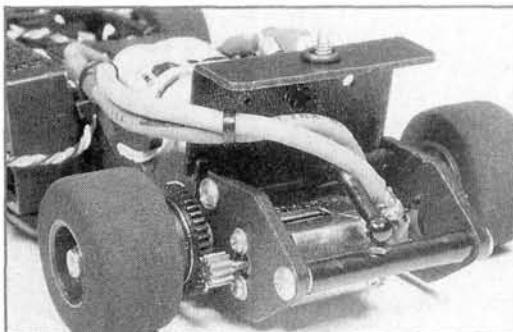
## BRP SUPER OVAL OUTLAWS



**The rear end features a separate motor pod that pivots on trailing arms. The coil-spring suspension does an adequate job of smoothing out the small imperfections on the road.**

ommends running on Latex-painted plywood.

I didn't have a painted-plywood surface, but the cement deck around my pool offered plenty of bite, with just enough slip to make things interesting. (Here on the East Coast, there aren't too many swim-



**The Super Oval Outlaws are powered by a mighty Trinity Slotworks motor. The optional ball diff makes the little truck corner better.**

mers during the winter months, so the pool has been drained and covered.) Don't run these cars near water! I'm sure you've heard that water and electricity don't mix very well (life is full of disclaimers).

With the 4-cell battery pack, my Super Oval Truck got up to some decent speeds, and I had nearly 20 minutes of run time before the battery started to show signs of dumping. If you were to race with other Super Oval Outlaws in 4-minute heats, you'd be able to run at least four heats before having to recharge the battery pack. If you pick up an extra battery pack, you'll probably be able to put in a full day of racing without recharging.

With the 5-cell pack, the little truck attained amazing speeds—about 20mph, which is ballistic for a truck this small. BRP also sells a 6-cell pack for those who would like to add a 1/18-scale missile to their arsenal.

### FINAL THOUGHTS

The Super Oval Outlaws are fun, easy to assemble and require very little space for racing. They don't require special electronics, so most people have the equipment that it takes to get started. They get up to some pretty impressive speeds, so they're challenging to drive, and their small size makes them almost irresistible. I can only imagine what it would be like to race this truck with nine other trucks on a tight banked oval; I bet it would be a blast!

\* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

### Likes

- Very interesting and even a little cute (OK; I said it).
- Can be raced in tight spaces.
- Practically indestructible.
- I could fit the car, radio, batteries and a few tools into a Trinity Transmitter Hauler.

### Dislikes

- Instructions could use a few more illustrations or photos to clarify some of the building steps.
- Axles are not supported by bearings or bushings.
- Small size makes competition a little scarce.



# Sedan Driving Tips

by AARON BINER

## Go faster with these pro techniques

THE NEXT TIME you go to your local track or parking-lot race, study how the sedan racers drive. Some will seem dialed, while others will look downright out of control. There are many ways to drive your Tamiya\*, Kyosho\*, HPI\*, or Yokomo\* sedan. Naturally, you'll want to drive smoothly like the fast guys, but even they use a variety of styles; which one is right for you?

The first step is to put things into perspective. Don't worry about developing a driving style until you have acquired basic driving skills. You need to be able to drive your sedan around the track without hitting any of the fire hose, boards, corner dots, or other track borders. Only after you've completed this "basic training," will you be ready to develop the driving style that best suits your personality.

### THE "ROUNDING" DRIVING STYLE

No one style is best for everybody, but a good one to start with is the "rounding" style. This method is used by many top

$\frac{1}{12}$ - and  $\frac{1}{10}$ -scale on-road racers and by fast sedan drivers on wide-open, full-width, on-road tracks.

When you use the rounding style, your objective is to set up to drive smoothly through the inside of the apex of each turn. After you've steered out of the apex, position your car in the middle of the lane in the next straight section, and hit the throttle, setting up to drive smoothly through the inside of the apex of the next turn. This might seem simple, but try this for a 4- or 5-minute heat, and you'll find it can be very tricky with eight or nine other cars on the track. But if you maintain your concentration and apply this strategy consistently

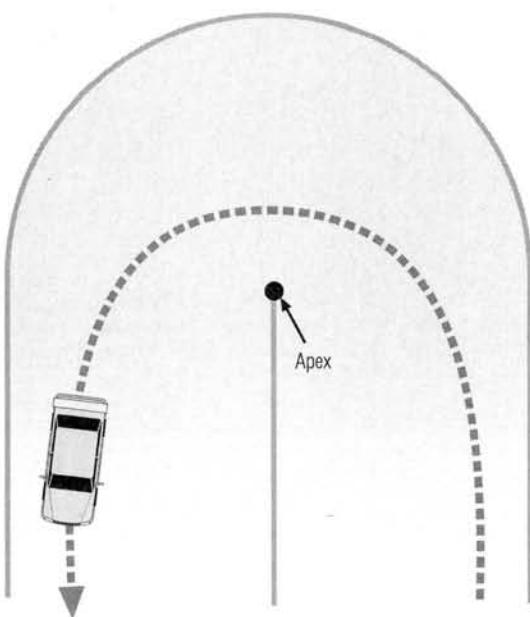


Figure 1. The "rounding" driving style

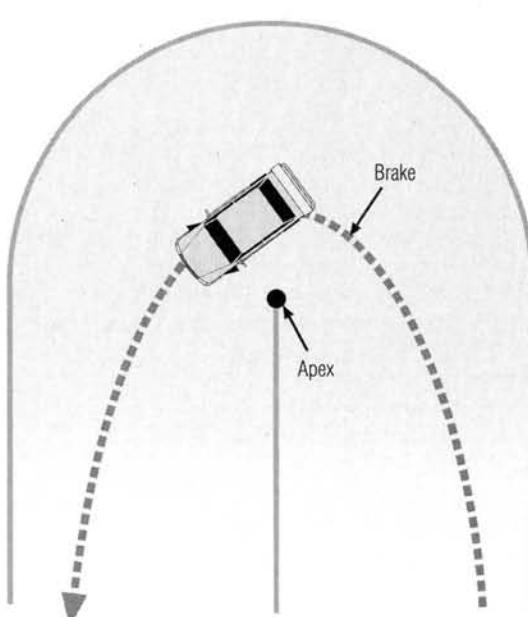


Figure 2. The "sliding" driving style.



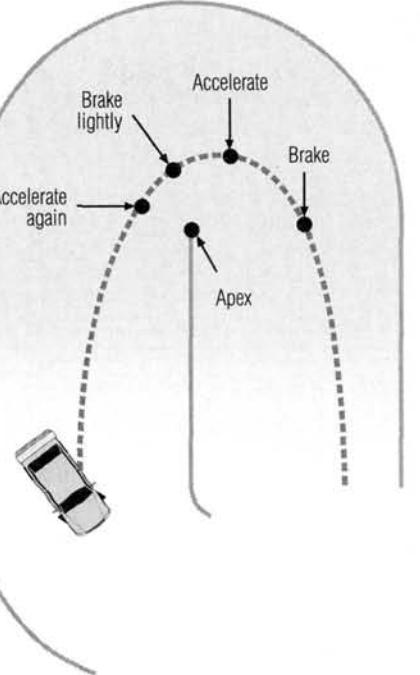
lap after lap, your chances of winning will be very good.

To master this strategy, your car must be appropriately lowered. Otherwise, you risk having too much body roll in the turns. This is a key consideration, because too much body roll coming *out* of a turn will prevent you from being able to set up properly for the next turn. You won't be able to do this if your car is rolling in the opposite direction. For an explanation of how to lower your sedan so it won't have excessive roll, see "Slammin' Your Sedan" in the March 1996 issue of *R/C Car Action*.

### THE "SLIDING" DRIVING STYLE

If the rounding style is not your cup of tea, try the sliding style. Your objective?—to drift or *slide* your cars through turns. This is achieved by going into the turn with some speed, tapping the brakes just enough to break the rear end free, then power-sliding your way into the apex of the corner. This works well for some drivers, and it's a popular style on medium-size tracks with 180-degree switch-back-type turns. Again, setup is the key to mastering this driving style.

Set up your car with a little more body roll than you would for the rounding style, because without enough body roll, your car will tend to understeer and be unresponsive. If, however, you set up your car with too much body roll, you run the risk of traction rolling. If you decide to try



**Figure 3. Braking to go fast.**

the sliding style, experiment with stabilizer bars, shock springs and oil in different weights. Be sure you understand how to set up your car, and practice by yourself for a while before you try this style out in a race. If your car isn't set up right and you haven't practiced enough, this driving style can be the subject of heated argument on the drivers' stand as you punt other cars during the race!

### BRAKING TO GO FAST

Now, suppose the rounding style doesn't work for you, and you're getting into too many fights because of the sliding style. Don't give up; you can still try the braking style, which is based on the smooth application of the brakes in the turns. You do this by accelerating straight out of each turn to a point just before the middle of the next turn. Then you hit the brakes lightly,

## Getting Ready for Your First Race

It's 8 a.m. on the day of your first race. You're nervous. You take a few deep breaths and march up onto the drivers' stand. You try to look cool, hoping nobody will notice you're faking it. The race starts. You're confused and bewildered. Adrenaline to the rescue! Suddenly, you're so involved in getting your car around the track that nothing else matters. Then the race is over. Maybe your car broke. Or maybe you lucked out and didn't come in last. It doesn't matter; you're hooked!

When the race is over, don't be afraid to ask the experienced racers questions, or even to ask them how you did. Most of them remember what it was like when they were beginners, and they're more than willing to help. Their expertise and experience will help you understand what works and what doesn't. This will help you to become skillful much more quickly than you could on your own.

Show your car to other racers and ask what they think. Try to pick up advice on driving and setup techniques for different tracks. When you get home from racing, review your races in your mind, and try to identify what you did right and what you did wrong. Find an open area to practice on. Set up cones or homemade markers, and practice driving figure-8's for better control. The more driving time you get, the better.

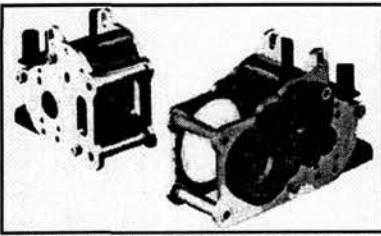
If you're just beginning, don't get too caught up in buying a lot of hop-up parts; this will probably only confuse matters and empty your wallet. Eventually, you may need hop-ups and other specialty parts, but you have to be a pretty good driver before these things make a difference. Remember, 80 percent

of R/C racing is in the driving; the rest is just frosting on the cake.

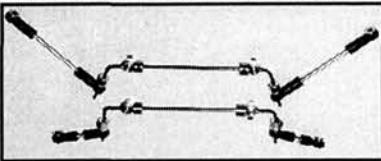


## TECH RACING

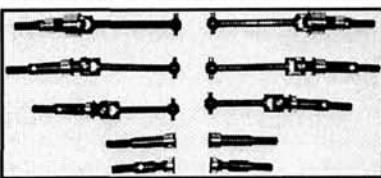
Superior Hop-Up Parts for Tamiya  
4WD FWD M-Chassis



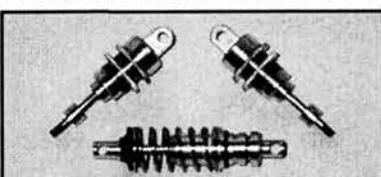
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## SEDAN DRIVING TIPS

turn into the inside apex of the turn, accelerate again, hit the brakes lightly, and accelerate again when your sedan is 75 to 80 percent out of the turn and aimed toward the middle of the track and going into the next turn. This is tricky, and it takes a lot of practice to maintain this style during a 4- or 5-minute heat. Expert drivers commonly use this style on small, tight tracks when speed isn't a consideration; it's also the predominant style on many small, tight, off-road tracks. Setup is important for the braking style, but not critical as for the other techniques. The main thing is to make sure you have plenty of traction and steering to get around the tight turns.

### SEEING DOTS

A good tip that applies to all these techniques is to imagine dots at points on the track where you need to take action; then practice by anticipating these dots as they come up along the track. You don't necessarily need to be driving your car to do this. You can get results just by visualizing your way around the track for a few laps—the R/C version of connect the dots! Practicing and visualizing this way will allow you to develop rhythm during later heat races.

Trying a variety of driving styles will help to make you a better driver, but practice is the most important factor. To find which style works best for you, use a stopwatch to compare your lap times while trying different driving styles. You may even want to try a few methods of your own. Be creative, and try to think about how to take each turn efficiently. If a turn gives you trouble, practice until you catch on.

It's important to track your progress and measure your results. The next time you are at a race, try to get a copy of your race results that shows your individual lap times. By checking your lap times for a number of races, you may be able to determine which driving style and setup work best for you. You might even want to keep a log of your race results from race to race to see where you are improving and where you need more work.

Remember that no matter which driving style you choose, how much fun you have is the most important consideration. If you get a big kick out of driving in a way that risks traction rolling in all the turns, then by all means, do so. Because if you're not having fun, then you're not driving in the style that is best for you!

\* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

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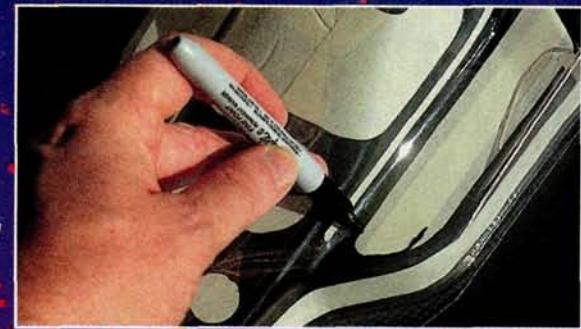
# Cheap Paint Tricks

## Simple tricks using spray cans

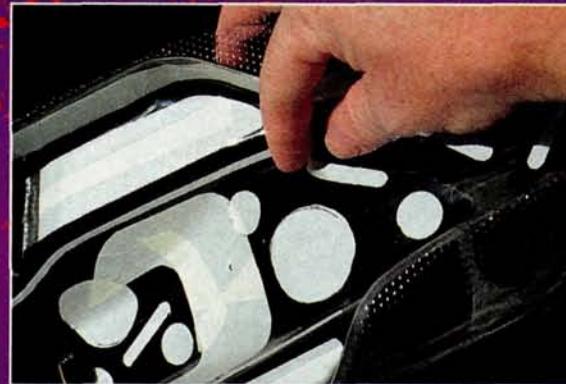
by Mike Ogle

**A** FEW budget-minded racers have told me that since most of the techniques described in my "Cheap Paint Tricks" articles require that you have an airbrush, they really aren't all that cheap! Well, I hear ya; not everybody can afford an airbrush setup. (I borrowed one from a friend about seven years ago, and I don't think he'd even want it back now.) So this time, for everyone who doesn't have an airbrush, we'll be looking at the kinds of cool paint tricks you can do with just a couple of spray cans. These are "really" cheap paint tricks!

**1** On the outside of the body, use a broad-tip Sharpie™ marker to plan your design or help you see where you're masking. It can be wiped off later with denatured alcohol.



PHOTOS BY MIKE OGLE



**2** On the inside of this Dahm's\* off-road body, I'm masking off the side body panels and some geometric shapes before spraying on the main "blended" body colors.



**3** Before spraying, quickly wipe all the exposed Lexan on the inside of the body with denatured alcohol.



**4** Just to add some interest to the scheme, I splattered some green paint off a Q-Tip™ onto the body before I sprayed it. It's pretty hard to goof this up; just dip and fling with a quick snap of the wrist. Voilà! You're Jackson Pollock!

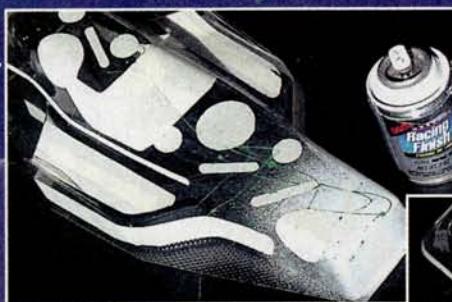
### DO IT WITH SPRAY CANS

The main difference between painting with an airbrush and painting with a spray can is that the airbrush will give you an adjustable-spray pattern, which can be narrowed down to do fine, detail work and very small, "blended," or fogged, areas. A spray can, however, always produces a large spray pattern, which is great for large areas of solid paint coverage. You can, however, use a

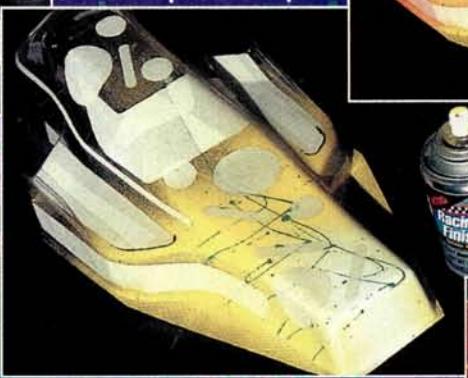
spray can's larger spray pattern to create a multicolored, blended scheme; you just have to make these areas much larger.

No matter whether you use an airbrush or spray cans, the first step to any successful paint job is proper planning. Our old friend the broad-tip "Sharpie" permanent marker is still my favorite for drawing on the outside of a car body. It produces a dark, easy-to-follow line that can be used

**7** Fluorescent orange was next—almost all the way to the back of the car.

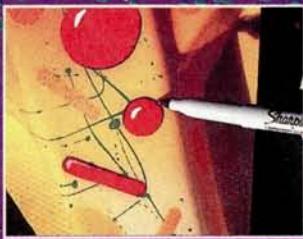


**5** Start spraying! On this scheme, I first sprayed just the tip of the "nose" white. This is about all the control you can reasonably expect with the aerosol can's wide spray pattern.



**6** Next, I sprayed on yellow—overlapping the white and extending back to the windshield.

**10** After removing the masking, I sprayed some of the circles a solid red and experienced the spray-can curse: too much wet paint bled under the masking tape, producing a small, ragged-edge area. If this happens, try touching up the outside of the shapes with a Sharpie™ as shown. For major paint glitches, you can always depend on a strategically placed Novak® sticker!

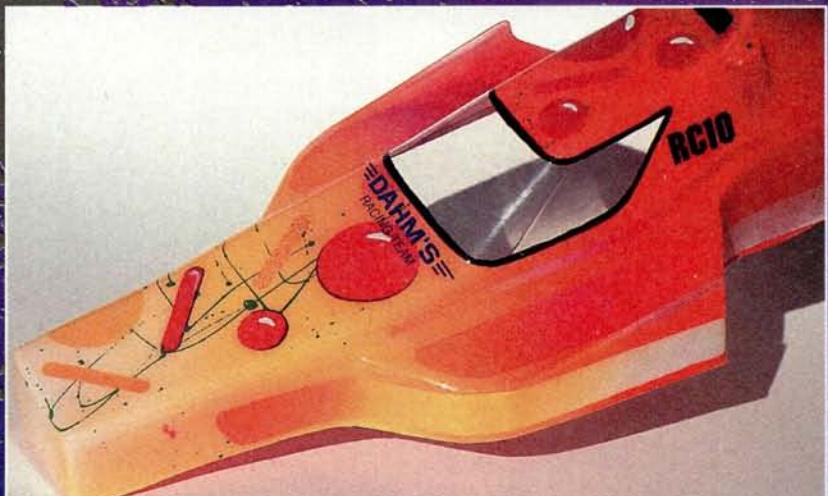


**8** Before spraying on the last main body color (red), I peeled out some of the long stripes that ran all the way to the back of the car. This "fades" them out at that end.

**9** Finally, I sprayed on the red—overlapping the orange to blend the two colors. This works especially well with similar colors, such as red and orange, and with the thinner, more transparent "candy" and metallic colors.

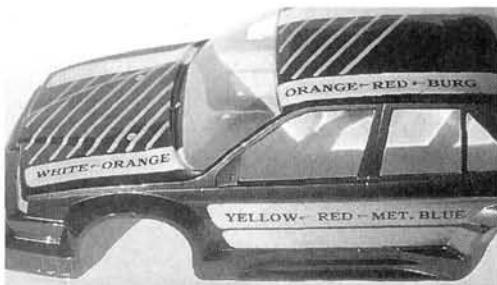


**11** Brush on some white paint to "highlight" the circles and give them that shiny "gumball" look. You can do this on the underside, before spraying, or add them later, as I did here.

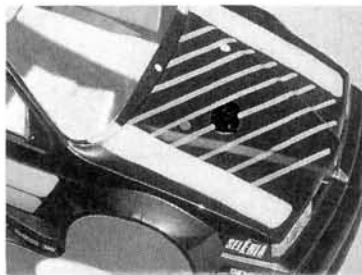


**12** The finished spray-can paint job. Nobody will believe you didn't use an airbrush!

# A few more tricks



**On this sedan body, I labeled the color-spraying sequence of the stripes: burgundy, red, orange to white on the top stripes; and metallic blue, red, to yellow on the sides. The car's overall body color is blue, fading almost to black. This was achieved by spraying the whole body Pactra\* Metallic Blue (which is pretty transparent by itself) and backing it with silver at the front blended into a black undercoat at the rear. This would work equally well with any of the "candy" or metallic colors.**



**On the hood, thin diagonal stripes fade from red to white. If you really wanted to get fancy, you could peel off alternate stripes and spray them to fade the opposite way—white to red.**



**The finished sedan body! Spray cans offer a simple, but effective, way to achieve a superb paint scheme.**

as a guide when you mask the inside of the body, and it can easily be rubbed off with a little denatured alcohol. For an easy "spray-can special," plan a scheme in which a color on the front half of the car "fades" into a contrasting color on the rear half.

But that's a little too easy for most of us, so let's add some "speed lines," which fade out at the rear of the car. After masking out all the window areas, run some long, horizontal strips of masking tape from near the front of the car all the way to the back. If you're good with scissors or a hobby knife, try rounding off the front edges of these strips. The most time-consuming part of any paint job is masking the body; this is where spending extra time really shows in the finished products.

And even if you live where it's usually warm, you'll get a much finer, more even spray mist out of any spray can if you first heat it in warm water—not too hot; you don't want to make the can explode. Heat increases the pressure of the gas propellant in the can, so it gives a more powerful, finer spray pattern that's more like that of an airbrush. This also works when you want to get the last little bit out of a spray can. Just when the paint starts to sputter and it looks as if it's about to give out, heat the can, and you'll be surprised at how the spray is renewed—at least, for a while.

**Step 1** Now, before you start shaking the can and going wild with spraying, take 30 seconds to wipe off the body's unmasked areas with your denatured alcohol. This removes any stray masking-tape adhesive, mold-release compound, fingerprints and just plain dirt before you immortalize it under a layer of paint. Once you've sprayed over crud, it's there to stay!

**Step 2** First, spray the front half of the body with your first color. Then, from the middle of the body, just let your coverage sort of fade out, and leave the rear half of the body clear.

**Step 3** Next, peel off those long strips of tape, and then completely spray the inside of the body with a lighter color. When you turn the body over, you'll see that the masked-out strips start with hard-edge lines at the front of the car, soften out toward the middle of the car, and then start to fade

into the second color at the rear of the car. If you're a good shot with the spray can, try just edging the front edges of your stripes with a third, contrasting color.

**Step 4** Now try this little trick: cut out some geometric shapes and place them all over the body. Again, if you just spray one half of the body, peel off the shapes, then spray the rest of the body in a different color, the shapes will seem to appear out of one end of the car or the other, depending upon which end is "their" color. With a little extra brushwork, such as adding highlights to the shape after you've removed the masking, you'll be able to achieve some astonishing effects. For even more "dimension," before you spray your first color, splatter paint on the body using a toothbrush or a Q-Tip™. I think you can piece this technique together for yourself! Check the photos to see what this looks like.

Finally, don't hesitate to experiment. You'll get excellent results using spray cans as long as you plan the job thoroughly, take your time masking and use your imagination.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 168.

# BUDGET MODIFIED MOTOR GUIDE



• go fast, spend less •

by Doug Mertes

**A**RE YOU tired of the power limitations of stock motors? Do you want the *oomph* and rpm of a real modified motor? Do you yearn for the dirt rooster-tails produced by low-turn modified winds? Are your buddies out in the parking lot laughing at your stock-powered car or truck's inability to keep up with their high-speed beasts? Are you low on cash?

No problemo, my friend. Many of the companies that produce those expensive,

hot, hand-wound modified motors also market less expensive machine-wound modifieds that will really get your juices flowing. What's the real difference between those \$90 wonders and the much cheaper budget modifieds, and how can you get your hands on one? Read on; all will be revealed. Let us show you how even an inexpensive modified wind can bring you fully up to speed yet leave you with sufficient spare cash to replace the tires you'll burn up as you pass your friends.

# BUDGET MODIFIED MOTOR GUIDE

## BUDGET BASICS

There are three types of modified motors, but at each level, there are subtle differences between manufacturers and tuners.

**• Top performance.** These modified motors have hand-wound armatures that are trued and balanced very, very carefully. The armatures are inserted into motor cans that have ball bearings, adjustable timing and some of the strongest and most carefully matched magnets available. Then they're fitted with brushes and springs meant for a specific type of racing—for on-road,  $\frac{1}{12}$ -scale, off-road, etc.—and they're tuned to produce maximum horsepower and efficiency. With a top-of-the-line modified motor, you're paying for premium components, skilled labor and specialized equipment. Obviously, they cost money.

**• Mid-level performance.** These motors have machine-wound armatures, but because they're wound on a machine, they cost less to produce. They have ball bearings and adjustable timing, so while their level of performance is somewhat lower, they still run very strongly. You can improve the performance of many by carefully assembling them, truing their commutators and making wise brush and spring selections. If you're lucky, you can find an experienced modified racer who will show you the ropes and enable you to get every last bit of available power from a machine-wound motor.

**• Lower-level performance.** At this level, you'll find motors that are very similar to stock motors. They use fixed-timing endbells and bushings on the armature shaft, and their cans

are almost always sealed like those of stock motors. Also like a stock motor, the commutator can only be trued on a stock comm lathe. When this type of motor wears out, you can't really rebuild it; instead, you throw it away. They cost about the same as stock motors, or are even a little cheaper. They're good "practice" motors to use when you're setting up your car or truck for a fast stock motor, because they'll allow you to tune the suspension for speed while saving your killer stocker.

## OK, I'M SOLD!

### WHO DO I GIVE MY MONEY TO?

The manufacturers listed in the chart offer a selection of budget modified motors. They're available from hobby shops and mail-order catalogues. They can all be used for any type of R/C vehicle, although some are better for some applications than others (see chart below). Generally, for off-road trucks, I advise people to use motors with 16 to 19 turns because they produce more torque. They'll spin those larger tires a lot more easily than a motor with fewer turns, and they'll give you more gearing latitude. Off-road buggies seem to do well with 12- to 17-turn winds, depending on the traction at your track. Once again, the greater the number of winds, the easier it will be to set up your car. On-road cars in  $\frac{1}{10}$  and  $\frac{1}{12}$  scale can use almost any motor, but 11- to 16-turn multi-strand motors seem to be the most popular these days. Oval enthusiasts like motors with fewer turns—period. Looking for a recreational motor to bash around in the backyard? Shoot for a motor in the mid-teens. It won't over-tax your budget-level speed control, and you'll still get some decent run time.

## Budget Motor Applications

Car	Turns										
	17	16	15	14	13	12	11	10	9	8	7
1/10 on-road—4 min.	-	-	-	-	■	■	■	■	-	-	-
1/10 oval—4 min.	-	-	■	■	■	■	■	■	-	-	-
1/12 on-road—8 min.; 6-cell	■	■	■	■	-	-	-	-	-	-	-
1/12 oval—5 min.; 6-cell	-	-	■	■	■	■	-	-	-	-	-
1/12 carpet—8 min.; 4-cell	-	-	■	■	■	■	■	-	-	-	-
1/10 off-road—4 min.; 6-cell	■	■	■	■	■	■	■	■	-	-	-
1/10 truck—4 min.; 7-cell	■	■	■	■	■	■	-	-	-	-	-
4WD dirt oval—4 min.; 7-cell	-	-	■	■	■	■	■	■	-	-	-
2WD dirt oval—4 min.; 7-cell	-	-	■	■	■	■	■	-	-	-	-
1/10 sprint car—4 min.; 7-cell	-	-	-	■	■	■	-	-	-	-	-
Drag racing	-	-	-	-	■	■	■	■	■	■	-
Truck pulling	-	-	-	-	■	■	■	■	■	■	-
Touring car	■	■	■	■	■	■	-	-	-	-	-
Formula 1	-	■	■	■	■	■	-	-	-	-	-

## READING THE CHART

**Catalogue #**—the manufacturer's part number for each motor

**# Winds**—the number of times each strand of copper wire is wrapped around each pole of the armature.

**# Strands**—the number of wire strands that are wrapped around each pole, e.g., two strands of wire is a "double."

**Bearing?**—is the motor's armature supported by ball bearings

**Adj. timing?**—does the motor have a fixed endbell, or does it have adjustable timing.

**Bushing?**—is the motor's armature supported by metal bushings

**List \$**—the suggested retail price of each motor as supplied by the manufacturer.

## REEDY

### Reedy Modifieds

#### Conquest 14

Cat. #	492
# Winds	14
# Strands	2
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	40



#### Conquest 15

Cat. #	491
# Winds	15
# Strands	2
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	40



#### Conquest 17

Cat. #	490
# Winds	17
# Strands	2
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	40



#### Conquest 14

Cat. #	497
# Winds	14
# Strands	2
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	60



#### Conquest 15

Cat. #	495
# Winds	15
# Strands	2
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	60



#### Conquest 17

Cat. #	496
# Winds	17
# Strands	2
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	60





# BUDGET MODIFIED MOTOR GUIDE

## PARAGON

### Eclipse Bushing

Cat. #	ECO12
# Winds	14
# Strands	2
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	37



### Eclipse Bushing

Cat. #	ECO15
# Winds	17
# Strands	2
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	37



### Eclipse Bushing

Cat. #	ECO17
# Winds	14
# Strands	4
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	37



### Eclipse Bearing

Cat. #	ECO114
# Winds	14
# Strands	2
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	55



## TOWER

### Speed Secret

Cat. #	TOWC0200
# Winds	14
# Strands	4
Bearing?	no
Adj. Timing?	yes
Bushing?	yes
List \$	44.99



## FANTOM

### Fantom

Cat. #	407
# Winds	16
# Strands	3
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	50



### Fantom

Cat. #	406
# Winds	16
# Strands	4
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	50



### Fantom

Cat. #	F405
# Winds	any
# Strands	any
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	45



Note: because availability and the dollar/yen exchange rate fluctuate, this information is subject to change.

### Eclipse Bearing

Cat. #	ECO115
# Winds	15
# Strands	2
Bearing?	yes
Adj. Timing?	no
Bushing?	no
List \$	55



### Eclipse Bearing

Cat. #	ECO117
# Winds	17
# Strands	2
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	55



### Eclipse Bearing

Cat. #	ECO119
# Winds	19
# Strands	2
Bearing?	yes
Adj. Timing?	yes
Bushing?	no
List \$	55



## PARMA

### Club Spec

Cat. #	14305
# Winds	13
# Strands	2
Bearing?	no
Adj. Timing?	yes
Bushing?	yes
List \$	55



### Reaper

Cat. #	14306
# Winds	15
# Strands	2
Bearing?	no
Adj. Timing?	yes
Bushing?	yes
List \$	55



### Punisher

Cat. #	14109
# Winds	23
# Strands	1
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	45



### Lawbreaker

Cat. #	14110
# Winds	15
# Strands	2
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	45



## KYOSHO

### Mega 360

Cat. #	KYOG2477
# Winds	22
# Strands	1
Bearing?	no
Adj. Timing?	no
Bushing?	yes
List \$	31.99



## MACHINE-WOUND

Machine-wound, budget-modified motors offer exceptional performance for a price that's substantially less than that of a hand-wound, top-of-the-line racing motor.



But, beside their prices, what's the *real* difference between hand-wound and machine-wound modifieds? And is the price difference justified by improved performance?

- "Machine-wound" means that the armature's copper wire has been wrapped by a machine—in a random pattern; the windings are wrapped less efficiently, and that results in increased resistance and less power. Hand-wound motors are built with more precision. For

## Hand-Wound vs.

maximum efficiency and power, their windings are tightly wrapped in a specific pattern. The machines that wind the armatures can accommodate wire only up to a certain size. Hand-

The term "budget modified motor" describes any motor that has fewer than 27 turns of copper wire wound around its armature, has a list price of \$60 or less, and has a machine-wound armature rather than one that has been hand-wound. But all budget modifieds are not equal; some have features and performance that place them at the top of our price scale, while others are more closely related to stock motors. Which one is right for you? This list of features should help narrow the choice.

- Bushings.** Made of a lubricant-impregnated bronze, they support the motor's rotating armature. Bushings are very inexpensive, but they operate with considerable friction, and they therefore don't last as long as ball bearings.

- Ball bearings.** These are more expensive than bushings, but they last much longer than them, and they allow the armature to spin with less friction; this equals higher rpm and more power.

- Fixed endbell.** This means that the molded endbell is permanently attached to the motor can. Motor timing is fixed, and disassembly is difficult, but fixed-endbell motors are less expensive.

- Adjustable timing.** If a motor has adjustable timing, its endbell is held on the can with screws and can be rotated to alter timing. The endbell can also be easily removed for maintenance and rebuilding. These motors are more expensive than those with fixed endbells.

If you're just starting out in the hobby, you'll find that a budget modified motor that has bushings and a fixed endbell will more than satisfy your need for speed. If you have your sights set on racing, you'll probably want ball bearings and adjustable timing, but they cost a bit more.



wound motors can be made with larger wire, which enables them to operate with less resistance and heating, which equal more power!

- Generally, machines can't wrap the armature with wire of mixed sizes. Hand-wound motors can be made

tures are coated (usually with epoxy), and that helps to prevent the windings from coming loose under high rpm. Machine-wound motors are usually more likely to "throw" a wind.

- Machine-wound modified motors are usually balanced to lower rpm.

wire is usually only crimped to the commutator tabs. The hand-wound armature's wire is welded to the commutator tabs—a more secure connection.

- More expensive, hand-wound motors are usually made using the

ter quality already installed.

So which is for you? If you run for fun or race on a club level, you'll find the power of a machine-wound motor more than adequate. But if you race more seriously or you



## Machine-Wound. What's the Difference?

with wires in any combination of sizes, and that gives the motor builder more flexibility when building multiple-strand winds such as doubles, triples, quads, etc.

- The windings of hand-wound arm-

stock-motor standards. Hand-wound motor armatures are balanced to higher standards so that they may achieve higher rpm with less vibration.

- The machine-wound armature's

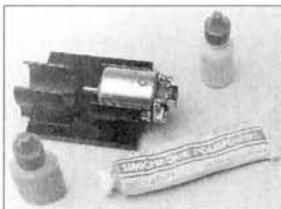
manufacturer's latest and most powerful magnets and can; machine-wound mod motors often use older can-and-magnet designs. Also, most machine-wound motors come with stock-type brushes, while the hand-wound modified has brushes of bet-

simply want the fastest available motor, try a hand-wound. Whether or not the extra performance of a hand-wound motor is worth the difference in price depends on you.

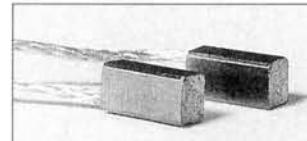
## Tuning Tips

**M**any budget modified motors come from their suppliers having been tuned only very little. You'll find that the techniques you used to make your stock motors go faster will work just as well with low-cost modifieds:

- 1 Use a brush-hood alignment tool to set the brush hoods at exactly 180 degrees. Several companies make tools specifically for this. Shown here is Trinity's brush-hood alignment tool.



- 2 If the motor has bushings, break them in with Brasso or some of Doc's Secret Sauce (three parts Trinity blue comm



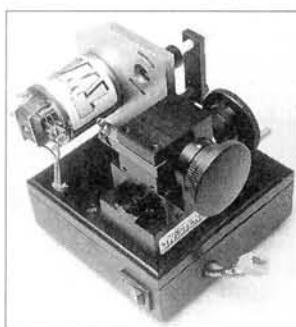
- 3 Select a set of high-quality brushes to fit your application, and match them with good brush

springs of the proper tension. If you aren't sure which ones to buy, ask at the track or the hobby shop. If you can, break in the brushes with a brush cutter; it will protect the comm from excessive wear.

- 4 True the comm with a stock motor truer. If you don't have the right equipment, ask a friend or a shop to do this. To maximize motor power and

life, do this every 10 to 12 runs, especially if you use

the motor to race. A modified motor with adjustable timing may be disassembled to cut the comm; that's a much simpler process.



- 5 Clean the comm and brushes regularly with a comm stick. Trinity, Parma and other companies make great products that will keep your brushes and comm squeaky clean.

## OLDIES BUT GOODIES

Many budget modified motors have been offered over the last couple of years. Some are no longer available from their manufacturers, but you'll still find them in hobby shops or at swap meets. In the chart at right, you'll find a list of the older budget modifieds, just in case you run across one.

MANUFACTURER	MOTOR	CATALOGUE #	# WINDS	# STRANDS	BEARING?	ADJ. TIMING?	BUSHING?	LIST \$
Trinity/Speedworks	Ground Zero	0777	15	1	-	-	-	28.00
	Pole Position	-	15	2	*	*	-	45.00
	Monster Mash	0008	16	1	*	*	-	45.00
	Buggy Master	-	20	2	-	-	*	28.00
	Road Beast	-	20	3	*	*	-	45.00
	Chris Doseck	0446	13	3	*	*	-	45.00
	Tony Neisinger	0555	14	4	*	*	-	45.00
	Psychotic Reaction	2099	13	2	-	-	*	28.00
	Dirt Oval Outlaw	0004	24	1	-	-	*	28.00
	Super Speedway	0005	23	1	-	-	*	28.00
	Oval Man	0333	13	2	*	*	-	45.00
Point Blank	Outlaw Stock	P303	13	2	-	-	*	28.00
Tower Hobbies	Speed Secret	-	14	4	*	*	-	32.00
Kyosho	240ST	-	23	1	-	-	*	28.00

Note: Information—especially catalogue numbers and prices—on these motors is sometimes very difficult to obtain. As far as I know, none of these motors is still being manufactured.

# HOT BODIES

Setting the World on FIRE



**NEW 1/12 Nissan GTP #12201 & 12201-Lite.** By popular demand, includes more side-dam area, smaller cockpit & increased frontal down force. Also available in 1/10th version.

**NEW Mustang Funny Car #10500.** IEDA World Champion & National Record Holder. Innovative one-piece rear wing, side dams, parachutes and HB decals included.



**NEW '95 F-1 McLaren #10603.** Fits Tamiya, Kyosho, HPI, Corally and others. HB decals, turning vanes and ultra-lightweight helmet included.



**NEW Avenger Pro Stock #10502.** Ultra-narrow body design with rear deck wing, side-dams, parachutes and HB decals included. Unmatched realism.

**NEW '96 Ford F-150 Triton #10401.** Direct fit for Losi's XXT. Number plates, roll-bars, add-on spoiler and HB decals are included.



**Monte Carlo #10100 & 10100-Lite.** Narrow design w/trim lines, add-on spoiler & HB decals. Also available in 1/10th wide version & 1/12th scale.



**Hot Wings 4" #19200, 5" #19201, 6" #19202.** Single element wings for off-road, oval etc. (with trim lines).

Quality Lexan® bodies sold clear.

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Browns Mills, NJ 08015 USA;

phone (609) 893-7716;  
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## TEAM LOSI TECH TALK

### SEALED TO PERFECTION

When you operate gas-powered trucks, the engines can be very finicky at times. The simplest fix for gas engines that aren't running consistently is to simply seal all the areas on the engine that could potentially leak air. Most, if not all, of these areas are on the carburetor.

To seal the carburetor, you'll need a good-quality, high-temperature silicone sealant, which can be found at any auto-parts store. Start by removing the carburetor and applying sealant around the neck of the carburetor. When you replace the carburetor make sure that none of the sealant gets into the engine or the carburetor. Next, remove the nuts that hold the fuel fittings and needle-valve housings to the carburetor. There should have been a wrench or two included with your engine that will fit these nuts. Apply silicone sealant to these fittings before re-attaching them. Again, it's very important not to allow sealant into areas that could block the fuel flow in the carburetor.

Once a carburetor has been properly sealed, it can operate much more consistently and be much easier to tune. If you check any of the factory racers' trucks, you'll find that every one of their carburetors is sealed.

### NEW STUD IN TOWN

Team Losi has just released a truck version of their popular, race-winning IFMAR Stud tire. The IFMAR Stud truck tire was used by Brian Kinwald to TQ and help him win the '95 ROAR Nationals held in Savannah, GA. Several months of testing and development went into this new tire. You'll find that the IFMAR Stud has a newly designed core with specially configured ribs to reinforce the tire's carcass. The result is a tire that has great traction and can also handle the bumpy tracks.

The new IFMAR Stud tire is available in Team Losi's exclusive Silver compound and, like other Team Losi Silver compound tires, it comes with a free set of high-quality, foam tire inserts. The part number for the IFMAR Stud truck tire is A-7639S.

\* \* \*

*Let us know what's going on! Address your questions and problems to Team Losi, "Tech Talk," 13848 Magnolia Ave., Dept J, Chino, CA 91710.*

## BUDGET MODIFIED MOTOR GUIDE

### Gearing a Modified

If you decide to swap your stock motor for a modified, you'll have to gear your car or truck differently, even if the motor isn't an expensive high-zoot screamer. To begin with, use a pinion gear that's five teeth smaller. If this means that you use a pinion gear that's smaller than 17



teeth, you should probably go to a larger spur gear (pinions smaller than 17 teeth are sometimes not as round or as well-formed as larger pinions).

After running your car or truck for 30 or 40 seconds, check the motor temperature. If it isn't too hot, check it again after running it for a minute or two. If it seems no warmer than a stock motor that has been run for the same time, you're ready to start fine-tuning the gearing. Go up a tooth at a time, and give yourself a full 4 or 5 minutes of practice every time you go up a tooth. When you reach the point at which the car starts to feel soft, i.e., loses acceleration, after a couple of minutes, get off the track; you've gone too far by one tooth, and you'll have to drop back down. You may also find someone who runs the same type of motor and can perhaps give you a better starting point for gearing. Just be aware that, to function properly, mod motors require smaller pinions and/or larger spur gears. If you gear the motor too low, you'll burn it up in a run or two. Check the brushes if you aren't sure. An overheated modified motor will turn the ends of the brushes blue and silver. If you see that happening, you'll know you've gone way too far. Replace the brushes, clean the comm and back off by a couple of teeth for another try.

*The addresses of the companies mentioned in this guide are listed alphabetically on page 168.*



# Does COST-CONTROLLED

Inside

Look at  
Trinity's  
Successful  
Street  
Spec  
Program

Associate editor George Gonzalez was taken away in cuffs because he was having too much fun.



PHOTOS BY JOHN HOWELL AND GEORGE M. GONZALEZ



Some of the participants in the Northeast Street Spec series.

# racing really

by John Howell

HOSTING A HOT EVENT

**B**ill Marshall of Marshall's Hill Top Hobbies brought R/C racing to Honesdale, PA, back in 1987, when he built a dirt oval next to his hobby shop. In '89, Bill expanded and built the indoor carpet oval where the race we attended was held. Since he opened the place to the public, Bill has added an off-road track and has paved the dirt oval. Bill has participated in or seen most popular forms of R/C racing, so George and I sat down with him for a few minutes (while he wasn't busy racing or running the race) and asked him why he decided to participate in Trinity's Street Spec series.

**John:** What made you get involved with the Street Spec series?

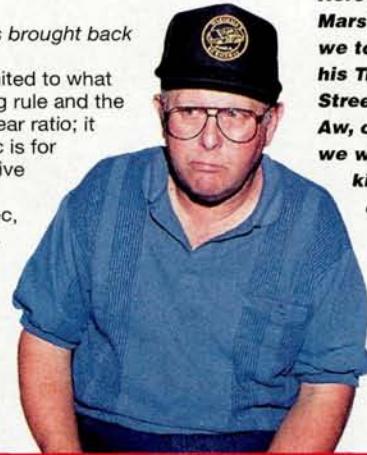
**Bill:** It's affordable racing, and I like to see that. I want to see everyone who wants to race be able to afford it. The way some of this stuff is going with the direct-drive pan cars, the \$500 dynos, laptop computers, \$350 chargers; you don't need that stuff to race, and I think we've proven that here.

**John:** What do you think Street Spec has brought back to the hobby?

**Bill:** It takes it back to when you were limited to what was available. I really like the new gearing rule and the fact that everyone has to run the same gear ratio; it makes the racing more even. Street Spec is for someone who wants to get into direct-drive pan cars, but doesn't know a ton about setups or adjusting cars. With Street Spec, all they have to concentrate on is driving. It's a good learning experience for the novice racer, and it helps the vet racer who wants to keep racing but doesn't want to keep spending a ton of money.

**John:** So there's more emphasis on driving skill than on spending money?

**Bill:** Right. Absolutely.



I want to see everyone who wants to race be able to afford it.

**Here's Bill Marshall after we took away his Trinity Street Spec car. Aw, c'mon Bill, we were only kidding! You can have it back!**

"Wow," you think to yourself. "These guys are hardcore! This is something I really have to get into!"

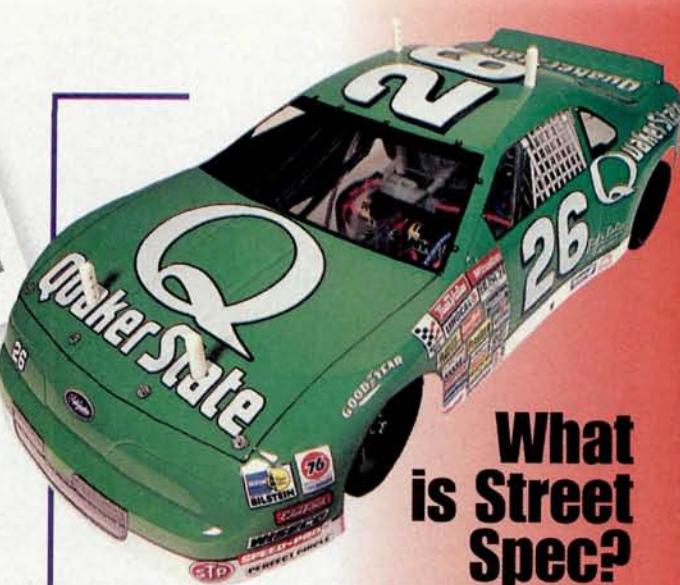
So you saunter off in the direction of the hobby shop to see what it takes to get hooked up with the complete "full-blown, on-road racing setup" that you overheard one of the guys in the pits talking about. You tell the guy behind the counter that you'd like to join the fun, and he gives you an estimate of what it will cost to be competitive, "...if you can even keep up," he adds.

"Zoinks!" you exclaim as you read the piece of paper. It's a tad more expensive than you had anticipated. You ask the hobby-shop owner if there are less expensive cars and

**At most events, racers are usually busy wrenching on their cars in between heats. At this race, they had a pizza party!**

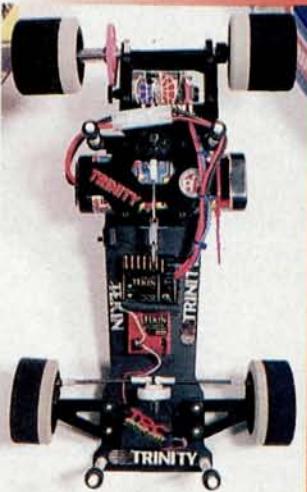


**Keziah Lain (bottom) and Valarie Struble (top) were invited by their cousin to check out this Street Spec race (their first R/C race). When asked if they'd go to another one, they enthusiastically said they would.**



## What is Street Spec?

For those of you who are not familiar with the Street Spec program, here it is in a nutshell. Trinity, recognizing the need for a competitive yet cost-controlled racing environment, developed the Street Spec series based on the S-Spec 10 on-road chassis. The car itself is a relatively basic pan car. It has a rear pod complete with a damper, like conventional pan cars, and it uses kingpin/coil-spring-type front suspension. You can buy the car as a complete kit that includes the chassis, body, motor and battery, or you can buy the components separately. The series rules are very strict, and allowable modifications are kept to a bare minimum. In their Street Spec manual, Trinity stresses, "If you want to run modified motors, matched battery packs, titanium and graphite chassis components, Street Spec is *not* for you."



**Above:**  
Trinity's Jake Flurer unveils his secret weapon...  
*uh...we're not sure, Jake, but we don't think that fits into the rules!*

At the race, the new gearing rule was the hot topic of discussion. So what's all the hoopla about? Well, in Trinity's initial race series, one of the few stipulations was that gearing choice was not limited; you could choose any overall gear ratio. Since then, Trinity has changed that rule a bit. The new rule is,

"Any unmodified 28-tooth pinion and 120-tooth spur gear may be used." The reason for the rule change? According to the folks at Trinity, it was actually an easy decision to make; it makes the racing more even and levels the playing field.

Trinity's Tony P. put it to me this way, "Street Spec is all about having fun. The less tuning time you have between heats, the more time you have to have fun talking to your buddies or whatever. With the new gearing rule, we've eliminated one more variable that you have to mess with. The cars are also much closer in overall speed, and that makes the competition a little closer." So, how many racers were opposed to the new rule? None that I met.

### What's with the New Gearing Rule?

about having fun. The less tuning time you have between heats, the more time you have to have fun talking to your buddies or whatever. With the new gearing rule, we've eliminated one more variable that you have to mess with. The cars are also much closer in overall speed, and that makes the competition a little closer." So, how many racers were opposed to the new rule? None that I met.



Street Spec program in place? If not, call Trinity at (908) 862-1705, or fax them at (908) 862-6875 and speak to Rick Icker about getting a series going.

## COST-CONTROLLED RACING

explains that these are excellent drivers who rarely make mistakes, and that it's hard to just jump right in and be competitive against such skilled drivers. At this point, it's starting to look as if racing might be more frustrating than fun, so you decide to keep on movin' down the road. "Maybe I'll take up these model trains over here at the other counter," you think to yourself.

It's a common scene. Basically, our hobby has reached such a level of sophistication that it has become hard for novices to participate in certain forms of racing. Unfortunately, this isn't the only variable that scares people away; negative attitudes can, too. How many times has a novice racer heard, "If you can't make 15 laps at this track, then you shouldn't be on it," or, "That car has no business being on the same track as these high-end cars." You get the idea.

### HOW CAN WE CHANGE THIS?

So how do we combat this problem? Simply put, cost-controlled racing is the answer, and it will keep the racing segment of our hobby alive and well. Without it, newcomers will continue to find it difficult to participate; there's no "grade school" of R/C racing in which novices can learn the ropes and then progress to "higher-end" racing if they want to—or is there?

Recently, I was invited to attend a cost-controlled event—one of Trinity's\* Street



**Edward Chernick, shown here with his mother, Ce-Ci, won the 50/50 raffle. With 50/50 raffles, everyone who wants to participate kicks in a buck or two, and then one person wins half the money, and the track owner wins half. So, if the pool ends up at \$100, some lucky racer takes home \$50! Track owner Bill Marshall splits his share in two and puts half of it into a "racers' points fund" for his race series. Whoever places first in the points series takes home the whole pile of cash at the end of the season! Not a bad deal, huh?**

Spec races in Pennsylvania. I gladly accepted the invitation and figured that, since I was going, I'd grab our newest staff member—associate editor George Gonzalez—and take him along with me so

that he could check it out, too.

We arrived in Honesdale, PA, home of Marshall's Hill Top Hobbies R/C track. Track owner Bill Marshall had his hands full because he was hosting a full house and running a number of classes on his indoor carpet oval. Even though he was very busy, he went out of his way to show us around the place, and he gave us some info on the facility and why he chose to participate in Trinity's Street Spec series (see accompanying sidebar).

George and I settled in, got our cameras ready to go and prepared to start covering the race. When we're at an event, we're on the gas because things happen fast. If we miss something, then you miss something. But to tell you the truth, covering this race was a little different; George and I were actually able to relax! Why? Because the people racing were relaxed as well. Usually, racers are frantically working on their cars, changing setups between heats, dyno-testing motors and cutting the motor comms; at this race, they had a pizza party between qualifiers! Also, at other major races, there are usually intense rivalries. At this race, everyone helped one another. If someone had a hot setup, they made sure everyone else knew about it. It was a very refreshing scene. I actually didn't feel as if I was working; I was having a lot of fun, and I was even a little bummed that I didn't race that night. I think George felt the same

# What Do Other Track Owners

After seeing the race at Marshall's Hill Top Hobbies and talking to Bill Marshall about why he got involved with Street Spec, I was curious about other tracks that participate in Street Spec. I spoke with two track owners from different states—Scott over at Leisure Hours Hobbies in Joliet, IL, and Scooter from Scooter's Hobby Hut in Niles, OH. Here's what they had to say about the program.

**John:** What made you decide to participate in Trinity's Street Spec series?

**Scott:** It's fun, competitive racing at an affordable price.

**Scooter:** We picked the Trinity Street Spec car and series based on Trinity's commitment to the class. They have resisted changes in the class, and

everyone at Trinity knows I've made a few, but their stubbornness has continued to make the class strong. When we go to other tracks and bring out the Spec cars, a lot of drivers laugh and sneer at them. I mean, how can a car that costs under \$200 be any good? But after one race, everyone is at the pit table looking the cars over and wondering how they handle so well and go so fast. At Scooter's, we include Spec cars in all our races.

**John:** What do you think it has brought back to the hobby?

**Scott:** The fun of racing R/C cars without the worry of who's cheating or who has the better equipment.

**Scooter:** The Spec racing has brought racing back to its basic form—having fun. After one

year of racing the Trinity Spec car, we still average more than 20 drivers on Friday nights. We've lost a couple of drivers, but they've moved up to the regular pan-car class and continue to race on a weekly basis. With our Spec car drivers, there seems to be something different about them. They take more time to help new drivers. They don't get upset and start yelling when someone punts them into the wall. Our youngest driver is six years old—little Richie. For being only six, Richie drives a mean car. A few weeks ago, he won the B-main, and one of the drivers had a plaque made for his trophy and gave it to Richie. The look on his face made us all smile. Even at our big events, Spec cars continue to be a big class, and there are drivers who travel more than five hours to

get to the race.

**John:** How do you think the new gearing rule will affect the series?

**Scott:** The gearing rule only enhances the Street Spec class because it keeps all the racers on the same level.

**Scooter:** The new gear-ratio rule is a great idea. We have had it in effect since February '95, and it has really tightened up the field of cars. It also helps the new racer with something that can be very confusing. They're worrying about rollout when they don't even know what rollout is! All they're concerned about is getting the car back in one piece. My only concern is that the race track should be able to determine its own gear ratio, because all tracks are different.

**W**hile George and I were watching one race, we noticed a Street Spec truck cutting one of the corners on the track a little too late. When it did so, another truck would slip underneath it. Lap after lap, this truck would go too high in the corner and lose ground on the frontrunners.

Being the awesome bench-racers that we are, George and I started to troubleshoot his ride. "He needs to change to a softer compound tire up front," I said.

**Novice racer Tom Warren gives Doogie the scoop on Street Spec.**



way. There were a lot of good people racing and kicking back, having fun. That's what R/C racing is all about, isn't it?

So, if you or someone you know have never raced and want to give cost-controlled racing a try, check out this cool series. Or, if you're a vet racer who is tired of spending too much money, you might want to check around and start up a Street Spec race series in your area!

\* Addresses are listed alphabetically in the Index of Manufacturers on page 168.

**It's not a competition about how much you spend; the competition takes place out on the track.**

"No way," said George. "He needs to put some heavier springs on the front kingpins and just try cutting in a little quicker."

Then the person next to us said that he thought the racer was doing really well considering it was his first race ever! We thought he was kidding, because the guy wasn't banging the boards or really getting out of shape, but he was serious! All things considered, the racer was doing really well for himself. When he pulled his truck off the track, we introduced ourselves to Tom Warren—a very likable guy. We spent a few minutes talking about why he got into racing Street Spec.

## Tom Warren— A Novice in Disguise

**John:** *I was told that this is your first race ever?*

**Tom Warren:** Well, it's actually my first Street Spec race. I've raced off-road electric stadium trucks a couple of times.

**John:** *What got you interested in cost-controlled Street Spec racing?*

**TW:** Because it's truly cost-controlled racing.

**John:** *So, like everyone else here, you're not interested in spending too much money to go racing?*

**TW:** Yeah, plus it's fun, and everything is pretty equal—the motors, the batteries, the cars. It's not a competition about how much you spend; the competition takes place out on the track.

**John:** *How long have you been in the hobby?*

**TW:** Four months. I got an electric car for my birthday.

**John:** *Is there anything you would change about the Street Spec races?*

**TW:** I don't really know. Maybe separate the beginner drivers from the advanced drivers in heats, but only in heats. That way, the beginners could battle it out with one another, and as they get better, they could move up to a more competitive heat. But such a change really depends on the person who runs the track more than on the program itself.

**John:** *What do you think about the car performance-wise?*

**TW:** I really like it a lot. It's a good car. You don't have to be a so-called chassis engineer to set it up. I like that about it.

**John:** *What are your feelings about the tires?*

**TW:** I like the fact that they're simplified. It's just one more thing that keeps everyone on equal ground. You know, at first, I was looking for something to race during the winter. I looked around and found Street Spec and saw how affordable it was. It's really cheap to get into. If I wanted to race one of the top-of-the-line pan cars or an off-road car, I could go through \$40 a night on tires. If I spend \$40 on tires for Street Spec, I'm set for a couple of weeks.

**John:** *Last year in the Street Spec series, racers were allowed to change the car's gearing; this year, they aren't. Are you in favor of the rule change?*

**TW:** Yes, because it keeps everyone more evenly matched. Before, when you watched a race, some guy might be a few laps ahead of second place, and that's a huge lead. Now they're trying to make the racing closer; it's more like real NASCAR and NASTRUCK racing.

**John:** *I notice a lot of the Team Trinity guys are here. Have you had the opportunity to get any hot setup tips or advice from them?*

**TW:** Oh yeah, they've been really helpful. They've told me which springs to run up front, which tire compounds work here. They've been really open to helping everyone. I had my spur and pinion too tight, and some of the other settings were a little off, and Rick [cker] came over, grabbed my car and completely dialed it in for me.

**John:** *So, will you come back and race in the series again?*

**TW:** Most definitely.

## Think?

**John:** Where do you see Street Spec and cost-controlled racing going in the future?

**Scott:** The future is bright because more racers are excited about spec racing, and retired racers are bringing out their radio equipment and running spec cars as well. It's up to Trinity and your local track to keep enforcing the spec rules to keep it fun.

**Scooter:** As a racer, I think that if parts are spec-legal, I should be able to use them. If spec bodies are spec-legal and they fit my car, I should be able to use them. And I hope they change the battery-plug rule. Though I believe that aftermarket slugs are great, I think the

ones that come with the cars are prone to failure and that changing them will make the cars more reliable. As a track owner, I think the rules are simple and easy to enforce. Most drivers follow the rules, but you always catch a few trying to bend them just a little—just like in full-size racing.

**John:** What's more popular at your track, the NASTRUCK or NASCAR bodies?

**Scott:** NASCAR bodies are the most popular, but NASTRUCKS are always welcome.

**Scooter:** In our area, NASCAR racing totally dominates the class. When we first started racing, trucks and cars were 50/50. One year later, we have all cars and no trucks.

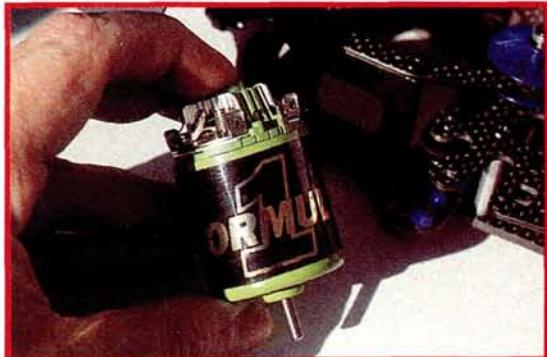


# Project Formula

## Part 2: Adding electronics

by MIKE OGLE

**I**N PART 1, we prepped an HPI\* graphite F1 "roller" chassis to be the foundation of *Car Action's* "Project F1." This month, we install a "specially for F1" racing motor, electronic speed control and radio gear before heading out to the proving grounds for Project F1's initial shake-down laps. As you'll see, we packed all the latest go-fast F1 goodies into the Project car—and not just for braggin' rights. When it's completed, we'll give the car away to a lucky reader! Stay tuned for details.



**Peak's 24-degree Formula 1 motor was a natural for the project: plenty of horsepower and a long run time! It's one of the later Green motors with all the goodies, and it comes already dyno-tuned for F1 racing.**

### PROJECT POWER

To provide the horsepower for Project F1, we wanted a motor that would provide ballistic speed and long run times. We selected one that was made for the F1s (literally)—Rick Hohwart's Peak Performance\* PP-105 Formula 1 stock motor. It's a ROAR '91 (24-degree) Epic-based tri-motor with 5.1 wet magnets that has been hopped up with high-performance brushes and springs and also dyno-tuned to ensure optimum performance. To show that they aren't bluffing about the race-worthiness of these Green monsters, Peak Performance includes the dyno-test

printout with each one.

Another component that seems specifically well-suited to these cars is the Tekin\* Formula 10 electronic speed control. The main distinguishing feature of this high-frequency, four-wire unit is a large aluminum faceplate/heat sink that could probably keep the ESC running cool even under the hottest racing conditions (Death Valley 500, anyone?). In fact, the size of the Formula 10's heat sinks makes it a little difficult to squeeze the controller into the narrow F1 chassis—especially if you use a full-size steering servo and receiver. Here's how I shoehorned everything in: I opened the ESC by removing the two tiny black screws that hold the faceplate on the red case, and I moved receiver-lead and switch-wire exit openings over to the side of the case by drilling a new hole for them. I was then able to stand the ESC on its side (see photo) with the fins of the heat sink running horizontally—also, incidentally, the best way to get cooling air to run "through" them. I rerouted the wires out through the

side of the case (no need for re-soldering, or anything like that). If you're worried about voiding your factory warranty, before you start, call Tekin, just to check.

The 64-pitch, 25-tooth pinion supplied with the HPI kit seemed to be a good place to start with the gearing; its longer shank gives a little extra "play room" to get the pinion to mesh exactly with the full face of the spur gear. We chose a selection of Kimbrough's\* 64-pitch spurs (made for F1s—no adapter necessary) to equip Project F1 for a track of any size. These gears are quiet; they're strong enough for



**The Formula 10 mounted upright; the body just fits over it, and the fins are now aligned correctly for an adequate airflow.**

the parking-lot wars; and, best of all, they're really concentric. I hate wobbly, out-of-round spurs that mesh perfectly at one point, but bind at 180 degrees rotation. This just robs you of horsepower.

Of course, we wanted to equip Project F1 with a really cool radio, and we decided on JR's\* Python. This is probably one of the sleekest transmitters ever produced, and it's comfortable to hold. The eight

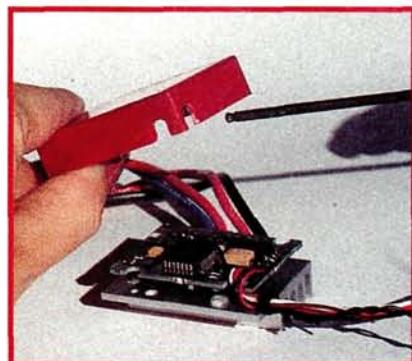


PHOTO BY MIKE OGLE

**Because underbody space was so tight, I re-routed the wires out through the end of the Tekin Formula 10 by making a small hole in the side of the case and mounting the ESC upright. Just like any other plastic part, if you don't like an ESC case's original color, you can dye it. This one will probably be black before I've finished.**

**Project F1, in primer, prepares to roll out for some pre-season testing.**  
**We're still looking for a permanent driver, and it could be you!**



and running gear



**JR's Python will be part of the giveaway package. It's one of the most comfortable radios I've ever handled, and it will be tough to part with!**

"AA" alkalines (or Ni-Cds) fit in the ergonomic handle to give it a great balanced feel. The Python has all the features you need for most electric cars, and it's very reasonably priced.

The HPI limited-edition graphite F1 kit

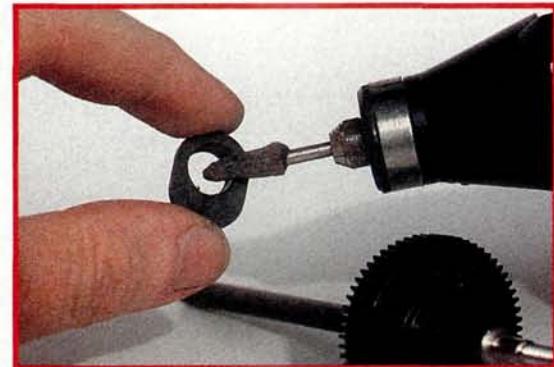


**You can run Tamiya\*-style front wheels on the HPI car just by swapping the Tamiya front bushings for the kit-supplied  $\frac{3}{16} \times \frac{5}{16}$ -inch bearings. You may have to move the steering kingpin to the in-line position to clear the smaller wheels' inner surfaces.**

comes with a full set of  $\frac{1}{10}$ -scale wheels (regular on-road style) with pre-trued foam tires; they work great, though they look a little too out-of-scale on the diminutive F1 chassis. But we wanted Project F1 to be able to run all the available parking-lot-racer tire and wheel combinations, such as the new semi-pneumatic F1 Hawgs from Pro-Line\*. On the front end, it was easy: pop the  $\frac{3}{16} \times \frac{5}{16}$ -inch flanged bearings out of the kit wheels and install them in the Tamiya-style fronts (the bearing sizes were pretty close to identical, considering they aren't metric).

For kingpin clearance inside the smaller Tamiya-style wheels, you may have to move the front steering kingpins to the "in-line" position.

Unfortunately, as you probably know, the Tamiya-style rear wheels have an integral diff-mounting system that won't fit HPI's conventional four-bolt on-road setup. So we decided to "retrofit" the HPI car with a Tamiya rear diff and axle setup. The exact problem is that the 6mm Tamiya rear axle is just slightly thinner than the conventional on-road axle found in most U.S.-made cars. The solution? Find a set of 6x10mm flanged metric bearings, which have the correct inside diameter and an outside diameter that's just slightly larger than the  $\frac{1}{4} \times \frac{3}{8}$ -inch rear bearings found in most on-road cars. Just choose the appropriate ride-height-adjusting bearing blocks, and use a Dremel tool or a small rounded file to enlarge the bearing hole slightly to fit the metric bearings. Take off a little material at a time, and test-fit frequently. The bearings should be seated



**The rear bearing holder/ride-height-adjusting blocks will have to be reamed out just a little to accommodate the new bearings. Go slowly; you want a nice snug fit.**



**The Tamiya graphite axle is just a hair thinner than the  $\frac{1}{4}$ -inch HPI axle. To run a Tamiya-style rear end, you'll have to replace the  $\frac{1}{4} \times \frac{3}{8}$ -inch bearings with a pair of 6x10mm bearings.**

snugly, but they should not be tight enough to jam their bearing races and bind up the rear axle.

Stay tuned for the conclusion of Project F1; we'll complete this land missile's hop-up and tell you how you can win this awesome ride.

\*Addresses are listed on the Index of Manufacturers on page 168.

# Showdown in Shizuoka

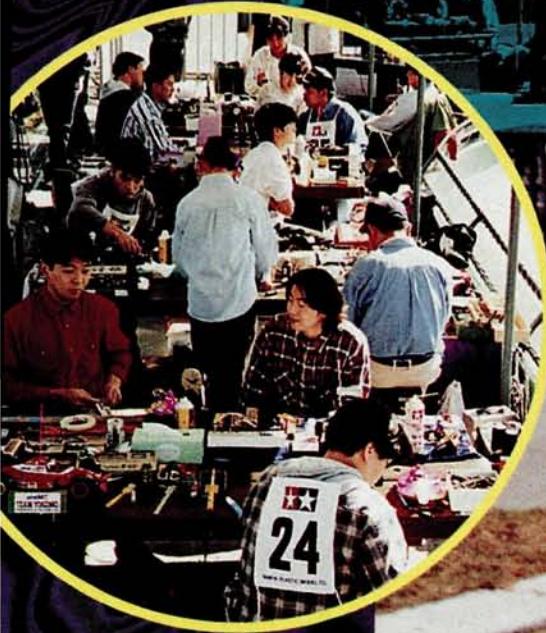
ワールドチャンピオンシップ  
タミヤグランプリ



Starting grid for F1 finals.

## Tamiya Grand Prix

## World



Who says F1s can't catch some air? Tsuyoshi Ishiyama gives the spectators a little aerial exhibition during the F1 finals.

**T**HE '95 Tamiya Grand Prix World Championship was held in November in Shizuoka, a city west of Tokyo, Japan. For two days, sedan and F1 champions from the U.S., Europe and Japan battled it out to determine who would rule the sedan and F1 circuit. In accordance with Tamiya's policy of promoting R/C sports to the general public, these top-level drivers were non-sponsored amateurs.

The Tamiya circuit (see Figure 1) is a permanent outdoor facility with a hard surface that's treated with a special coating to provide maximum bite. (Tamiya's regulations prohibit the use of any tire-traction chemicals.) To ensure a level playing field, only handout motors were permitted.

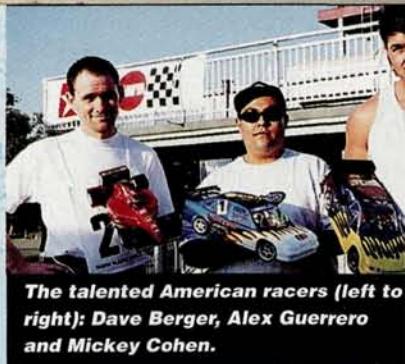
#### DAY ONE

The participants, who included Tamiya's European and American guests (all winners of their respective Tamiya National Championships), arrived in Shizuoka the night before the race so that they could practice the following morning. The track was compact and complicated, and the morning began with practice rounds, which were separated by class. First was Formula 1, second was FWD (called "FF" in Japan for front engine, front drive) and last was 4WD. This racing order was used throughout the event.



All the lucky contestants at the Tamiya Grand Prix.

During practice, participants used their own motors. In Formula 1, U.S. champion Dave Berger struggled to tame his Ferrari 412T F1 on the track. Berger's skills were outstanding, but he had difficulty getting his car dialed-in. In any event, his efforts were rewarded the following day. The Europeans were much more dialed-in to the track because they have more experience at Tamiya races, and their Euro-finals consist of a greater number of races. For instance, Michele Romagnoli (age 14) from Italy competed in the FWD class and beat out 4,000 rivals from more than 160 races held throughout Italy. Indeed, his talents were demonstrated during the qualifying round held in the afternoon where he secured the third position on the starting grid for the finals the next day. The qualifying round was held after the drivers' meeting and the introduction of each of Tamiya's foreign guest



The talented American racers (left to right): Dave Berger, Alex Guerrero and Mickey Cohen.



The European champions (left to right): Thomas Sesterhenn, Peter Burghauser and Michele Ramagnoli.

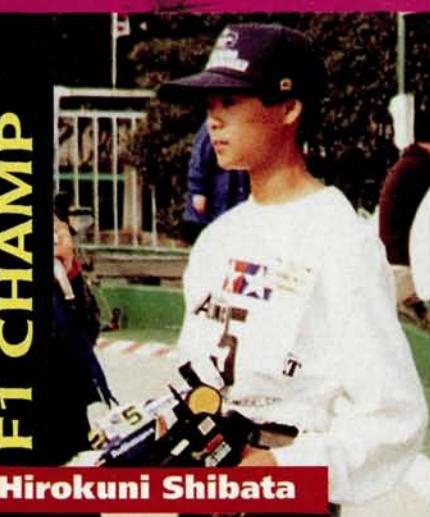
# Championship

## FWD CHAMP



Shinobu Shimabukuro

## F1 CHAMP



Hirokuni Shibata

## 4WD CHAMP



Yoshinori Itoh

## TAMIYA GRAND PRIX WORLD CHAMPIONSHIP

drivers. Also, it was at this point that the officials provided the handout motors to the participants. The racers' qualifying positions were determined by the drivers' best lap times during the 3-minute-sprint time trials. Because of the equal performance of the handout motors, the competition was close, and the fastest lap time altered with every run. The top three of the day are listed below. After the qualifying round, the participants were allowed to continue with their practice session.

### DAY TWO

The Finals were battled out in a three-Main format using point systems similar to many of the European championships. To deter-

## Tamiya Grand Prix Championship Finals

### Formula One

Pos.	Name	Age
1	Hirokuni Shibata	14
2	Tsuyoshi Ishiyama	20
3	Dave Berger	31
4	Peter Burghauser	23
5	Yuta Koike	17
6	Koji Iizuka	22
7	Koichi Iwasaki	32
8	Mitsuyoshi Kubo	18
9	Makoto Furutani	29
10	Toshihiro Kameyama	24

### Front Wheel Drive

Pos.	Name	Age
1	Shinobu Shimabukuro	22
2	Michele Romagnoli	14
3	Kiyoshi Aikawa	28
4	Alex Guerrero	21
5	Ken Fukuda	18
6	Yukihiro Kamiyama	25
7	Hijiri Itoh	20
8	Tetsuo Kimura	31
9	Masahiro Yoshizaki	21

### Four Wheel Drive

Pos.	Name	Age
1	Yoshinori Itoh	32
2	Takanori Aoki	26
3	Yusuke Kobayashi	33
4	Ryota Okamura	30
5	Thomas Sesterhenn	27
6	Toshiyuki Hirosawa	28
7	Toyomichi Nakabayashi	16
8	Akiyuki Nonaka	14
9	Yasuhiro Shikamata	22
10	Mickey Cohen	25



Tamiya employees prepare for the trophy presentation ceremony.

mine the winner of each Main, the Formula 1 class ran 25 laps, the FWD class ran 20 laps, and the 4WD class ran 18 laps (the first driver to reach the predetermined number of laps in his class won the Main). The Formula 1 class is always filled with surprises, and Dave Berger managed to pull a rabbit out of his hat. Positioned at eighth place on the grid, which was permanent throughout the finals, he took advantage of starting from the mid position while the top-ranking racers had difficulties taking the line they desired. Berger took second place for the first heat right behind Hirokuni Shibata, who was the favorite in that class. The first heat for FWD was a cool game as Shinobu Shimabukuro shaved away the laps effortlessly, followed by Romagnoli. The 4WD class also had Yoshinori Itoh making a steady run with Takanori Aoki following. Thomas Sesterhenn managed to squeeze into fourth place, but Mickey Cohen was behind the group at eighth.

The second Main can be described as the main event of the day with the world champs secured in both the FWD and 4WD classes. The Formula 1 Main was still the race to watch as Tsuyoshi Ishiyama made a near-perfect drive and won the Main



A Tamiya employee passes out the hand-out motors before the Mains.

unscratched. Ishiyama took advantage of being a citizen of Shizuoka and had plenty of time to prepare himself for the race. Berger took second place, while Shibata took third. All three gentleman were in line with almost the same points and had an equal chance at the championship, which would be determined during the third and final Main. The FWD class was dominated by Shimabukuro, who was running in a class of his own. His superb driving style won him a well-deserved world title. Kiyoshi Aikawa was second, and Alex

Guerrero made third place. Romagnoli rolled in fifth, which meant he had to put his hopes in the last Main to upgrade his final ranking. The 4WD class was again a duel between Itoh and Aoki, with Itoh outrunning Aoki to grip the title. Yusuke Kobayashi managed to get hold of third place, recovering from the disastrous 10th-place finish in the first Main.

The spectators were eager to watch the third and final Main in the Formula 1 class and it turned out to be one of the most exciting races of the

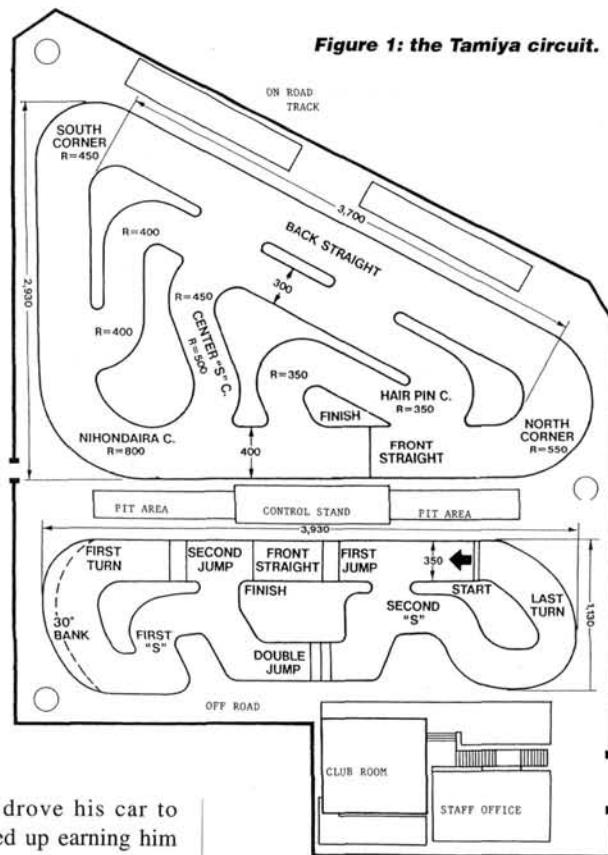


To keep things fair, Tamiya thoroughly inspected the cars after each race.

event. Ishiyama, who took the lead during the early part of the race, was soon passed by Shibata, who was sitting fifth on the starting grid. The fifth-position start for Shibata worked as an advantage for this young but aggressive pilot because Ishiyama would be pressured into counter-ing the other top rankers while Shibata paved through the traffic from behind. Ishiyama did well after being passed, but he ended up about 1 second behind Shibata. European champ Peter Burghauser managed to slide safely into third place while Berger steadily drove his car to fourth place, which ended up earning him the overall third-place win.

In the FWD class, Romagnoli demonstrated his talents and took top honors by outrunning the title-winning Shimabukuro. The result of the third heat won Romagnoli second place overall. Guerrero managed to

**Figure 1: the Tamiya circuit.**



## International Participants

### USA Champs

**Formula 1:** Dave Berger  
**4WD (sedan):** Mickey Cohen  
**FWD:** Alex Guerrero

### European Champs

**Formula 1:** Peter Burghauser, Austria  
**4WD:** Thomas Sesterhenn, Germany  
**FWD:** Michele Romagnoli, Italy

### Japanese Champs

**Formula 1:** Makoto Furutani  
**4WD:** Takanori Aoki  
**FWD:** Shinobu Shimabukuro  
**FWD:** Ken Fukuda

The Japanese team also included another 24 racers from Japan who qualified in the All-Japan Finals.

take fourth place, which was an indication of his driving potential. In the 4WD class, Aoki at last showed everyone his skills as the reigning all-Japan champ by taking the heat and securing second overall.

Despite their limited practice time, the foreign drivers demonstrated their superlative skills. The U.S. champs were also commended for their superb painting and detailing skills. Dave Berger and his highly detailed Ferrari caught the attention of the Japanese F1 enthusiasts, while both Alex Guerrero and Mickey Cohen's body-shell schemes were awesome.

### ENDURANCE RACE

After the race, the All-Euro, All-U.S. and All-Japan drivers teamed up to compete against the Japanese media teams in a Mini Cooper 1-hour endurance race. The top two places were secured by the All-Japan (first) and All-U.S. (second) teams.

The Tamiya Grand Prix World Championship was aired on Japanese TV, and it was sponsored by leading hobby manufacturers that included Tamiya, Futaba, Sanwa and Mabuchi.

Our special thanks to Mr. Y. Sano of Tamiya for providing the race information and photos. ■

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Astro Flight	Hyperdrive	RCPS
Autographics	Irrgang	Robinson
Barracuda	Jammin	Royal
BBR	Kimbrough	RPM
Bel-Ray	Lightning Rod	Saiko
Body Shop	Lightspeed	Sassy
Bolink	Litespeed	Schumacher
BRP	Lunsford	Southworth
CRC	Matrix (Integy)	Speedworks
C&M/Cobra	Max Cell	Stage III
Cam	McAllister	TA Emerald
Chicago mod	MIP	TD Ent.
Comp. Elect.	NMB	Tamiya
Comp. Craft	Novak	Team Losi
Cooper	Ofna	Tecnacraft
Crowe	Ozone	Teddy's
Dahm's	Paragon	Tekin
Dan's RC	Parma	Thor
Delta	Pole Position	Traxxas
Dubro	Power Source	TRC
Dumor	Precision Mot.	Trinity
East Coast	Pro Fit	TQ
Edge	Pro Line	Twinn-K
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Tuning and modifying the

# M R C Baja King



by George M. Gonzalez

I HAD the opportunity to be among the first to test MRC's\* Desert Thunder buggy (see the August '93 issue of *R/C Car Action*). In the December '94 issue, the buggy was featured once again; however, it had been completely modified for my "Project Desert Thunder" article. Since then, the buggy has been converted into its racing truck brother—the Baja King, and it has been seen terrorizing tracks from coast to coast.



The MRC Baja King has been noticeably beefed up with the help of various R/C manufacturers.



I enjoy the strange looks and funny comments when racers first see the Baja King. "Hey, Gonzalez, is your eyesight so bad that you need an enormous truck?" "What— are 1/10-scale racing trucks too small for your inflated ego?" And so on.

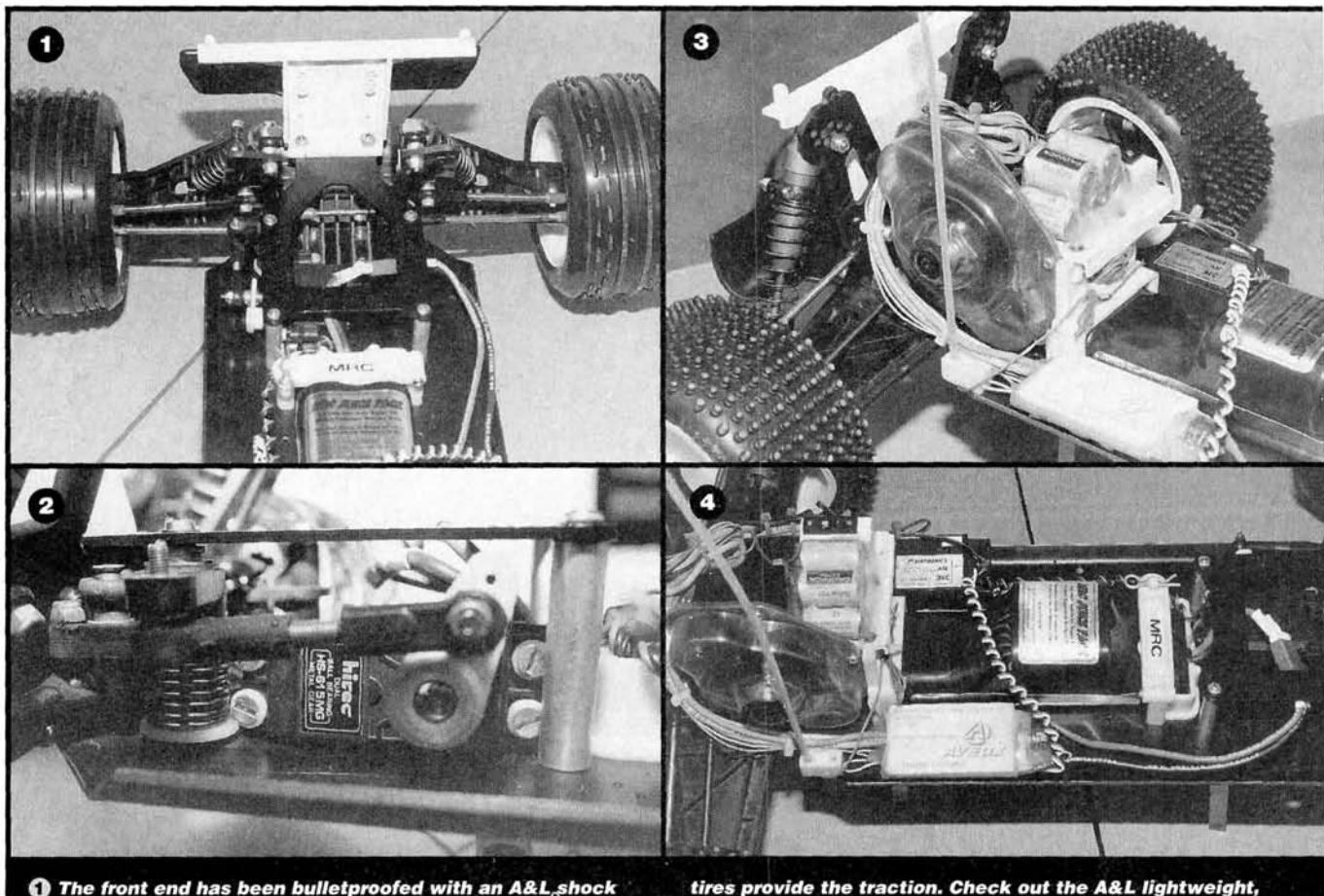
Well, once they see the truck charging down the straightaway at

blazing speeds and negotiating the turns without even slowing down, the loudmouthed racers become quiet. That's when I say, "Go ahead, hack me; I dare you!"

My boss and fellow off-road R/C racer, Frank Masi, caught a glimpse of the Baja King in action, and he was impressed with its speed and handling. At that point, he decided that it was time to feature it in our new "2nd Look" series, so here it is.

The Baja King is big and bad, even in stock form, but to create a competitive truck that would rival most 1/10-scale trucks, I added several hop-ups that are available through MRC, A&L Mfg.\*, Boca Bearings\* and Aveox Inc.\*

• **Front and rear shocks.** To limit the down-travel of the shocks, I installed two A&L shock limiters (part no. 7203) on each of the shock shafts on the inside of the shock bodies. This is an important modification because it prevents the A-arms from pivoting at an



**1** The front end has been bulletproofed with an A&L shock tower, titanium tie-rods, steering enhancement kit and Boca Ultra Seal bearings. **2** An extremely powerful Hitec HS-615MG high-torque servo keeps the King's massive front tires pointed in the right direction. **3** The hind end has many of the same upgrades as the front: A&L shock tower, titanium tie rods and Boca Ultra Seal bearings. MRC's new MSP-9 rear

tires provide the traction. Check out the A&L lightweight, Lexan gear cover. **4** The heart of the Baja King is the electronics. An Aveox 2-turn brushless motor and speed control really get the King motivated. An MRC 8-cell juice pack provides the amps. Notice that the 5-cell receiver pack has been mounted on the original speed-control mount.

extreme angle, which causes the dogbones to bind. I used the one-hole shock pistons all the way around and filled the front shocks with Associated\* 60WT shock fluid and the rear shocks with 50WT.

- Front and rear shock towers.** I used a set of front and rear A&L shock towers, which are made of lightweight, durable,  $\frac{1}{8}$ -inch fiberglass. They feature several shock- and camber-rod mounting locations for precise track tuning (front—no. 2015, rear—no. 2014).

- Adjustable turnbuckles.** To reduce weight and increase strength, I installed a pair of A&L's front and rear titanium turnbuckle sets (no. 7202). The turnbuckles are mondo thick, and they have holes in the center to make camber adjustments a snap.

- Steering bellcrank.** To improve steering response, I used A&L's steering enhance-

ment kit (no. 7201). The kit comes with a set of fiberglass servo-saver stiffeners that beef up the steering system. An adjustable titanium center link replaces the stock unit, and a set of tightly fitting ball ends removes the slop from the steering system.

- Transmission and drive-train enhancements.** The Baja King comes with a full set of bearings; however, my truck started out as a Desert Thunder buggy that came with bushings. For that reason, I installed a complete set of Boca Ultra Seal precision ball bearings. For smoother performance, I used Associated's Stealth diff lube on the diff balls and their black grease on the diff thrust bearing. I replaced the stock, 32-pitch spur gear and slipper-clutch mechanism with an A&L 48-pitch spur-gear adapter. This gives the truck a wider choice of gear ratios, provides smoother power transfer and lowers the rotating mass because of the lightweight design. This modification

means losing the slipper clutch, which some may feel is a drastic measure; however, I had no choice because I needed a higher, final gear ratio than was possible with the stock gears for the motor I had planned to use. The last tranny modification I made was with A&L's lightweight Lexan gear cover (no. 9033).

- Electronics.** To power this 8-pound beast, two electric motors are normally bolted to the motor plate. Rather than bolt on a couple of hot-wind, modified motors, which would drain the battery in a couple of minutes, I used an Aveox 2-turn brushless motor (PN 1412/2Y). The brushless motor puts out three times the power of the average electric motor, and it's extremely efficient, which translates into increased run time. The brushless motor requires an Aveox computerized speed control (no. F5MV), which is designed specifically for the motor. I also used MRC's 8-cell,

2000mAh battery pack to provide the wheel-spinning juice.

Hitec's\* HS 615MG high-torque servo kept the giant front tires pointed in the right direction. Although I could have used tandem steering servos, I decided to shed a few ounces and install one powerful unit. The signals are sent by an Airtronics\* Rival



**Associate editor George Gonzalez shows off his beast of burden.**

2P transmitter, and they're picked up by a 2-channel AM receiver. Using epoxy, I also installed a 5-cell, 600mAh receiver pack on the tranny brace (the Aveox speed control doesn't have BEC, so you must provide a power supply for the steering servo and receiver).

DA Graphite\* designed a special graphite motor mount for me; it has only one motor-mount opening so that dirt and small rocks can't get into the second motor-mount opening and foul up my pinion-and-spur gear. Speaking of gears, I used a Robinson\* 81-tooth, 48-pitch Stealth Silencer spur gear and a 35-tooth pinion gear, which gave me a 8.88:1 final gear ratio (a high ratio for most applications, but perfect for this truck with the Aveox powerplant).

**Beefed-up rear axles.** My World Scale vehicle was one of the first production units, and it came with rear axles that bent easily. MRC addressed this problem and released a large, rear-axle conversion kit (no. 9656010), which is now standard equipment on all World Scale vehicles. The conversion kit includes: a pair of re-tooled, rear-axle carriers; a pair of super-thick rear axles; four large ball bearings; and a pair of aluminum wheel hubs. (The top-of-the-line Baja King racing truck will include bearings, and the Desert Thunder Buggy and

Thunder King monster truck will come with bushings.)

**Traction.** The last modification I made was to install MRC's new, aggressive, multi-step-pin (MSP-9) rear tires. I still use the stock mini-pin rear tires on hard-packed dirt, but now I have an alternate set, which gives me more tuning options. The front staggered-rib tires are awesome, and they hook up well on all track surfaces.

The stock MRC Baja King body resembles Rick Johnson's Mickey Thompson Chevy S-10, and it's almost as big. All kidding aside, I've had this body for two years, and it amazes me that it doesn't have one crack anywhere! This is quite a testimony because this truck has seen more air time than all of my other R/C cars combined!

#### PERFORMANCE

My souped-up Baja King actually performs as well as, if not better than, most 1/10 scale racing trucks. Before you get on the phone and tell the world that George Gonzalez said World Scale is better than 1/10 scale, let me explain. Because of the Baja King's weight, its super-long front and rear track and its high-grip tires, the truck remains planted on the track at all times. I kid you not; it's almost impossible to get this truck on its lid. Because of this, the truck is easier to drive and very consistent on the track. Keep in mind that I'm not the greatest driver in the world, and I need all the help I can get. The power from the Aveox brushless motor propels the truck to speeds that are on a par with a 1/10-scale truck that's equipped with a hot modified motor, and the run times are in the 8-minute range. Not bad for an 8-pound R/C car.

#### FINAL NOTES

My MRC Baja King has taken the throne in my workshop as one of my favorite R/C vehicles. No other car or truck in my arsenal has even come close to giving me so much pleasure. Sure it's different and not as popular as 1/10-scale, but that's part of the reason why I like it so much. The main reason, though, is its awesome performance. Sure, I put a lot of time and money into this beast, but it pays me back every time I drive it. If you're looking for an R/C car or truck that will impress even the most discriminating racers, pick up a World Scale vehicle today.

\*Addresses are listed alphabetically in the Index of Manufacturers on page 168.

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WWW - We have web pages on the internet!  
ESP is presently setting up our own server  
so please use Yahoo to locate our site!

Oh No!  
Did I Ruin  
Another One?



## Repairing Stripped Threads in Plastic Parts

by Doug Mertes

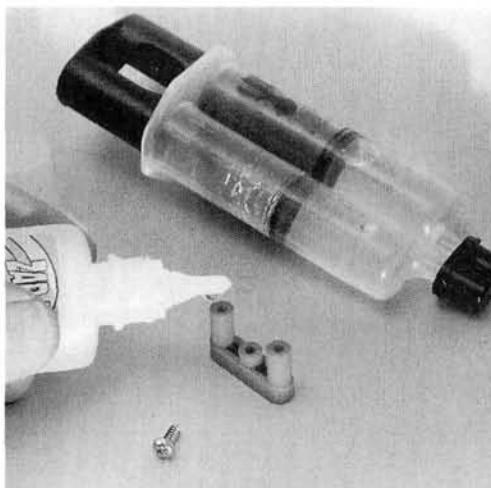
**W**E'VE ALL BEEN there. You're hard at work assembling a molded-plastic gearbox case, or putting the shock towers on your new Tamiya\* TA02 4WD car, and you get just a little too enthusiastic about tightening the screws. All of a sudden, there's less resistance when you turn the screwdriver, and the part isn't as tight as it should be. Why?

Because you've stripped the threads inside the plastic part, that's why!

Remember the instruction manual that you read before you started putting the kit together? You did read it, didn't you? It said something like, "When you begin to feel resistance when tightening screws into plastic parts, stop.

Don't tighten any further; damage may result." Well, you ignored that, and now the part is ruined...or is it?

I've been involved with enough "midnight thrashes" to have had a starring role in that scenario. When you get tired, or try to work too quickly, you get sloppy. So, I've tried a lot of cures for the dreaded strip-o-rama, and I'd like to share some with you.



**Put some CA or epoxy into the hole; let it set up, and then carefully thread the screw in. This might hold for a short while.**

### SOLUTION 1

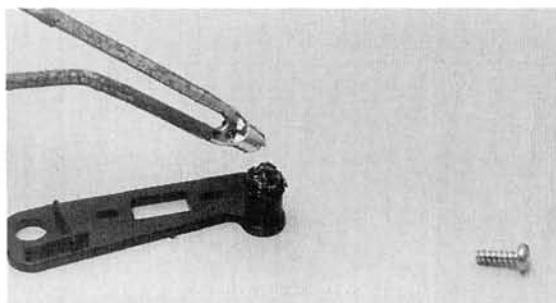
#### USE GLUE

The first cure that everyone tries is to use glue. Hey, they're plastic pieces, right? Don't we use glue to hold the parts of a plastic model together? This works on some plastics, but with R/C vehicles, it's usually a temporary fix at best. Most plastics aren't porous enough to allow the glue to work very well, and it just winds up jammed in the threads of the screw.

Try to drip a little CA, Plexiglas cement, Testors plastic glue, or two-part epoxy in the hole, or put a drop or two on the end of a toothpick, and smear it around the inside of the threads. Wait a few

minutes, then carefully replace the screw without tightening it too much. I did this once to keep a plastic lower eyelet attached to the shaft of a Tamiya shock absorber, but I was careful not to hit anything too hard! After my Main, the eyelet was still hanging on, but just barely. Although I'm sure there's some guy out there whose Hornet has been held together by superglue for the past seven years, I would not rely on this fix for very long.

In the same vein, you could try products that ensure an interference fit in between the hole threads and the screw. As long as the screw hole is in a fairly solid material, this might work for a heat or two: poke a folded piece of tinfoil or gum wrapper (paper would tear) down into the hole. When you replace the screw, it will compress the foil and wedge the screw in.



**Use your soldering gun to deform the plastic around the top of the hole. Re-thread the hole while the plastic is warm, but let the part cool down before fully tightening the screw.**

### SOLUTION 2

#### TRY A SOLDERING GUN

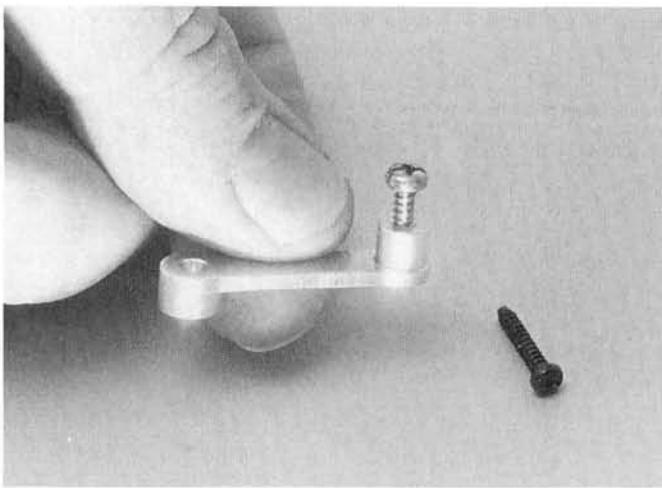
I've never tried this myself, but I've seen it demonstrated at the race track. Using your soldering iron (set the temperature as high as it will go), manipulate a little plastic into the screw hole, and melt it down in there. You could also use the gun to distort the top portion, or the upper edge, of the screw hole until it has a smaller diameter. While the plastic is still warm, insert the screw, and run it down past the melted portion, but don't tighten it all the way yet. Let the plastic cool completely, and then tighten the screw all the way. It seemed to work for one racer, who was trying to use a stripped hole in the rear bulkhead of his Losi JR-X2. He wasn't fixing a structurally critical piece, but those upper links really take a beating on an off-road track, so I'd try this only under dire circumstances. Make sure that you have adequate ventilation, avoid breathing the vapors from the melting plastic, and clean off your soldering gun while it's still hot, before the plastic becomes charred.

## SOLUTION 3

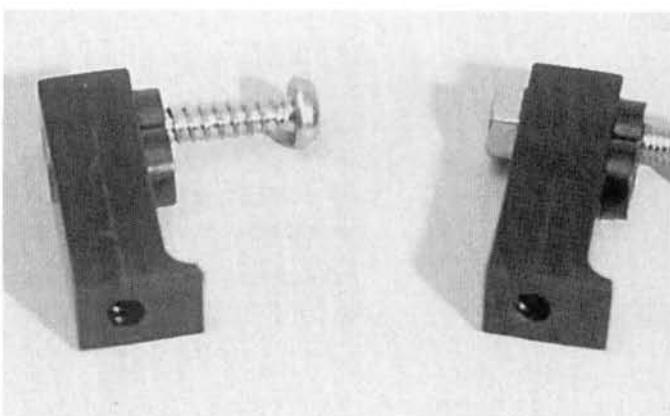
### USE A BIGGER SCREW

This works well if you can obtain a screw of the next larger size, or one that's longer but doesn't bottom out in the screw shaft. You don't even have to re-tap the hole for the new threads. Just carefully insert and turn the new screw, making sure that it remains perpendicular to the hole so it won't be crooked when you've finished. You may have to enlarge the hole of one or both plastic parts to accept the next screw size up, but this is a permanent fix that can restore the part to full reliability. To remember which hole takes the larger screw, before you take it apart again, mark both the bolt and the hole with a drop of paint or nail polish.

This is especially easy to do with parts that use SAE-size screws, because the most commonly used size in R/C cars is the 4-40 thread (no. 4 shaft, 40 threads per inch). The next size up is 5-40, which is



You can use a larger screw, but don't crack the shaft! This can fix the problem permanently.



If possible, run a longer bolt all the way through the hole to the other side, and secure it with a nut.

very common (a lot of Bolink cars use them throughout), and they're just large enough to make this fix work properly. Metric stuff is harder to do this with, because the most common size is 3mm; 4mm screws and self-threading screws are hard to come by. I have, however, replaced a 4-40 machine screw with a 3mm socket-head screw more than once. I used a 3mm screw to fasten the rear pod upper plate to the left (nylon) bulkhead on my RC10LSS for over two years, and it worked just fine. Also, you might replace a 3mm machine screw with a coarser-threaded self-tapping screw of the same size; sometimes, the pitch of the threads is different enough to allow it to grab onto the sides of the hole.

Another way to fix the problem permanently is to substitute a nut and bolt for the screw. If you can drill through the bottom of the hole and access the other side, you can use a machine screw that's longer than the depth of the hole and a flat or self-locking nut to secure it. Like the bigger screw, this can be a permanent fix, as long as you remember which hole uses the bolt and which uses the screw.

## SOLUTION 4

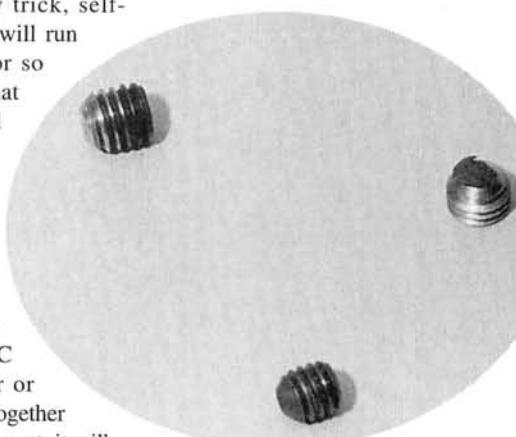
### USE A HELICOIL

Now, this is cool. There are devices that actually replace the damaged plastic threads with new metal threads made by companies such as Helicoil, Jergens and Re-Nu (try an industrial or machine shop supply house like MSC [800] 645-7270). The units are small, short cylinders or spring coils that are screwed into the hole after it has been drilled out to the next largest size. Obviously, you need enough "meat" around the screw hole to accommodate the larger drill and tap. The new threads are then interference locked into place using one of several mechanical means, depending on the manufacturer. Now you have metal threads in your plastic part!

I know racers who actually scout out potential trouble spots on their new plastic kits, and use Helicoil threads in those places from the very beginning. They'll put them in RC10 battery boxes, if they move the box around on the chassis for better weight distribution, or on rear suspension-arm brackets on RC10Ts, because some racers frequently change these to alter rear toe-in for different tracks. Rear, upper gearbox hatches on Tamiya 4WD sedans are excellent candidates for the Helicoil treatment; the possibilities are endless!

Price is the one drawback: a basic installation kit for 4-40 screws costs around \$40; a 3mm one costs around \$68. That includes all the tools and bits you'll need and enough inserts to fix a dozen or so "thread mashes." Once you have the tools, inserts cost only about \$6 a dozen, so you can count on a long-term cost of about 50 cents

per fix. Really trick, self-locking inserts will run another dime or so per insert. If that doesn't sound too pricey, maybe you should bring this up at the next club meeting, or when you talk to your R/C friends. If four or five people get together to buy the equipment, it will pay for itself in convenience and recovered parts in a very short time.



These Helicoil inserts are threaded into a larger hole drilled and tapped in the same location; their metal threads make it impossible to strip the part again!

\* Addresses are listed alphabetically in the Index of Manufacturers on page 168. ■

From the track to the parking lot.  
This is the R/C action as **you** see it.

# Grassroots RACING

This is YOUR PAGE—YOURS!! It belongs to you, the optimistic local racer on a budget who's looking for some evenly matched action; the individual who's in it for the fun of it all: the grassroots racer—whether on-road or off-road. We at *Car Action* really do want to see your tracks, your cars and your local heroes—men, women, boys and girls (we love cats and dogs, too!). Show us your local racing scene! Send photos with captions to "Grassroots Racing," *Radio Control Car Action*, 251 Danbury Rd., Wilton, CT 06897-3035.



Above: Ken's 1/8-scale F1 (top) and an inside look at his chassis (bottom).  
Left: some drivers take a practice run before the qualifiers.

## .....Gassing Up Your F1.....

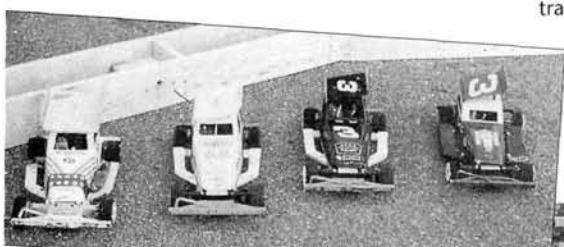
A few years ago, Ken Walton of Deerfield, NH, took a trip to Scotland, and while he was there, he had a chance to watch the 1/8-scale Formula 1 Gas-Powered Stock-Car Open. Having raced electric buggies for 10 years, Ken had always thought that gas-car racing was expensive and high-maintenance. While watching the race in

Scotland, he realized he was wrong. For years, the folks of England, Scotland and Holland have been racing a class of cars that are low-cost, tough and very exciting to run. These 1/8-scale F1s run on small, flat, paved ovals, and the rules for racing haven't changed in over 20 years.

Ken started this racing class at his local track—NASCAR Collectibles on Rte. 106 in Pembroke, NH. In the summer, they race on Wednesday nights, and in the spring and fall, they switch to Saturdays. Club members have also made trips to Scotland to race there.

Powered by .21 buggy engines, the club's Mardave buggy racers feature steel chassis, single-speed belt drives, ABS bodies and standard servos. For tires, nothing wider than a 1 3/8-inch maximum is allowed.

The races are run in 4-minute qualifiers, and for the larger events, they also run quarter-finals and semifinals. The top four hotshot drivers go on to the 5-minute Mains, and Ken says this is truly a "contact sport." Pushing someone's car out of the way is not only legal, but it's also definitely the acceptable way to go.



Above:  
four entrants line  
up for a quick  
photo. Right: an  
overview of the  
permanent oval  
track at NASCAR  
Collectibles.



**call now!**  
Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

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**Tamiya R/C Championship Series**  
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(402) 434-5050

**Trinity's Street Spec Series**  
(908) 862-1705



## Newberry R/C Raceway

Radio Controlled Races

Sunday at noon

## A Day at the Races

**Above:** Matthew Pavelich (third from right) competes in a race at the Newberry R/C Raceway in Michigan. **Left:** after recovering from a crash, Matthew's truck makes its way over a tabletop.



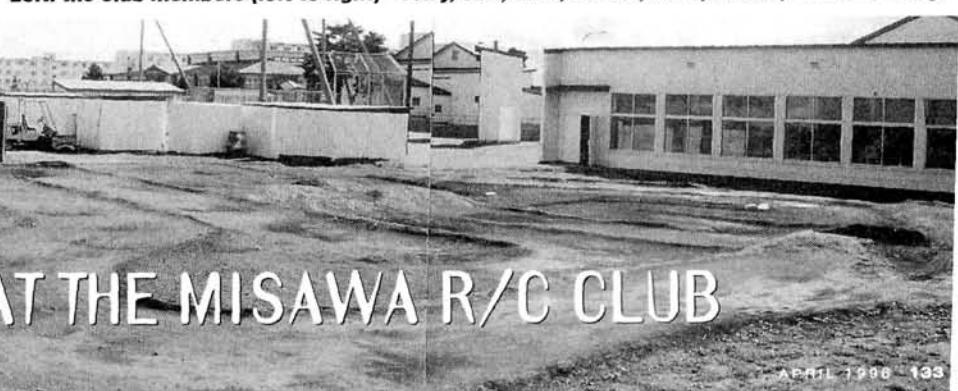
## Have a Blast, Go Fast

**Left:** the oval, parking-lot track features a wooden side wall, and the inside is made of 3-inch drain tiles. **Right:** the racers all forward to a day of fixed racing action.



**F**ormed about a year ago, the Misawa R/C Club is always looking for new members. The track (shown below) has really shaped up; it now features two double jumps, a rough section and a split tabletop. If you're looking for a new place to race and live in Japan, write to Terry Brancheau, PSC 76, Box 2946, APO AP 96319-2946 for more information.

**Left:** the club members (left to right)—Terry, Jeff, Matt, James, John, Mason, Paul and Larry.



## COME RACIN' AT THE MISAWA R/C CLUB



## Bad Boys, Bad Boys



**Above:** this modified RC10T and RC10 race on patrol every day at Gary Bair's track in Red Oak, IA. **Left:** a truck gets out of shape as it comes off the tabletop. **Below:** it's a smooth takeoff from the cross-over!



**D**on C. Moir sent us these shots of the Just for Fun R/C Raceway in Ukiah, CA. Why is he sure that this portable, sticky oval track is truly a grassroots raceway?

1. They run on a donation basis only. Every cent is put back into the track, and every racer pitches in during setup and clean-up.

2. As their motto states, "Having a blast and going fast" is the main goal of the club. The track promotes a fun relaxed and friendly atmosphere, but don't let that fool you. They save the serious competitive attitude for times when they race at NORRCA tracks.



Radio Control Car Action

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## ADVERTISER INDEX

Ace Hardware	102-105
Airtronics	4
America's Hobby Center	128-131
Associated Electrics	16,32,44-45,79, 84-85,112-113
B&B Software	124
B&T R/C Products	49
Boca Bearings	100
Bolink R/C Cars Inc.	143
BRP Products	100
Bruckner Hobbies	123
BSR Enterprise	56
C&M Team Cobra	62
Competition Electronics	101
Dahm's Racing Bodies	10
Davis Diesel Development	49
Deans	65
Dillon Racing	56
Duratrax	135
Elite Speed Products	117
ERI Associates Inc.	111
Extreme Motorsports	66
Freiver International	124
Full Speed Racing	49
Grand Motorsports	100
Hammand Ghuman	57
Hitec	120
Hobby Etc. Inc.	134
Hobby Products International	20-21
Hobby Shack	64
Hobby Shop Directory	160-161
Hobby Warehouse of Sacramento	144-147
Hobbytown USA	58
Horizon Hobby Distributors	12-13
Hot Bodies	78
Japan R/C Imports	125
Kyosho	71,137,149,159
Lunsford Racing	99
MaxMod Mini Sports	100
Maxtec Development	22
Model Rectifier Corporation	C4
Moore's Ideal Products	31,114
Novak Electronics	15,121
O.S. Engines	119
Omni Models	138-141
Parma/PSE	43,72
Peak Performance	70
Pro-Line U.S.A.	7,175,C3
Pro-Match	59
Progressive Technologies	39
Props & Wheels Raceway	98
Race Prep Racing Motors	34
RACEtech Motor Sports	25
Ranch Pit Shop	118
RC Tech	56
RCCA Classified	169
RCCA Tech Center	150-151
Robart Manufacturing	58-59
Robinson Racing Products	58-59
RPM	29
Savon Hobbies	80-83
Schumacher Inc.	148
Serpent Model Racing Cars	98-99
Sheldon's Hobbies	94-97
Stormer Hobbies	152-157
Tamiya America Inc.	C2,53,122
Team Losi	68-69
Team Losi Tech Talk	78
TEKIN	142
Testor Corp.	124
Tower Hobbies	162-167
Traxxas	136
Trinity Products	3,8,9,11,18-19,35,67,90-91
Wheels & Wings Etc.	158
World Class Inc.	66
Yokomo Ltd.	106-107

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**E.A.R.T.H.**, 2380 Main St., Rocky Hill, CT 06067; Ziggy Kwansnicki, (203) 529-0018

**JP's R/C Hobbies**, 200 S. Main St., Seymour, CT 06483; Jim Petzold, (203) 888-4849

**K/N R/C Speedway Inc.**, West St., Stafford Springs, CT 06076; (203) 684-9996

**Little Bristol Speedway**, 302 Rt. 39, New Fairfield, CT 06776; Dale Cote, (203) 355-4028

**NERCAR**, 36 Glendale Rd., Enfield, CT 06082; Phil Olsson, (203) 627-5410

**R/C Madness**, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (203) 741-6501

**Pro Hobbies Speedway**, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615

**Red's R/C Raceway & Hobbies, Etc.**, 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330

**River City R/C Car Club**, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948

**Sarasota Flat Track**, 4900 Fruitville Rd., Sarasota, FL 34232; Jim Wilson, (941) 371-3689

**Terryville Hobby**, 153 S. Riverside Ave., Rte. 72, Terryville, CT 06781; Harry or Ray

### DELAWARE

**4E Hobbies**, 1138 West Dupont Hwy., Millsboro, DE 19966; Peggy Evans, (302) 934-1708

### FLORIDA

**B+T R/C Central**, 811 Playground Rd. Ft. Walton Beach, FL 32547; (904) 863-1666

**Branford R/C Speedway**, Rt. 3, Box 240, Branford, FL 32028; (904) 935-0758

**Broward County R/C Race Club**, Mills Pond Park, Ft. Lauderdale, FL; Ed Augusto, (305) 525-3304

**Challenger Sedway at the Willows**, Willows Park & Okeechobee Blvd., Royal Palm Beach, FL 33414, Walt (407) 965-2790, or Mark (407) 790-6917

**Coral Springs Roadrunners**, P.O. Box 9632, Coral Springs, FL 33075; Randy Witte, (305) 474-5934 or Rick Schwartz, (305) 344-1983

**First Coast Speedway**, 6410 Walther Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161

**5-Fifty-5 R/C Raceway**, State Road 55, Bartow, FL 33830; Chuck Nolke, (813) 324-7406

**Greater Orlando Auto Racers**, 970 Keller Rd., Altamonte Springs, FL 32714; Dave Mottin, (407) 263-4819

**Hudson's R/C Raceway**, 590 Madeo St., St. Augustine, FL 32095; Steve Hudson, (904) 826-4050

**Hobby World Raceway**, 7273 103rd St., Jacksonville, FL; Ray or Greg, (904) 772-9022

**Louis Burton's R/C Raceway**, 4215 Mustang Rd., Lakeland, FL 33803; Louis Burton, (813) 665-1322

**Morris Kohl's Raceway & Hobby**, 1202 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626

**My Rose**, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (407) 744-3800

**NORRA**, 3300 Santa Barbara Blvd., Naples, FL 33942; Jerry Pecar, (813) 592-7562 or Mark Benfield, (813) 263-6861

**Ocala Radio Control Car Club**, 3500 SE 30th Terrace, Ocala, FL 34471; Steve Shook, (904) 694-5147

**Paul's Stadium Raceway**, 4511 W. Dr. M.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette, (813) 872-8662

**PBG R/C Motor Park**, 6351 Barbara St., Palm Beach Gardens, FL 33418; Doug Gleason, (407) 743-9791 or Tim Case (407) 627-2808

**Pro Hobbies Speedway**, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615

**Red's R/C Raceway & Hobbies, Etc.**, 1010 Creighton Rd., Pensacola, FL 32504; Linda Till, (904) 479-2330

**Southwest Florida R/C Raceway,**  
2425 Rivers Rd., Naples, FL 33964;  
Clude Armstrong, (813) 455-1143

**Superior Hobbies R/C Parking Lot Racing**, 430 E Hwy. 436, Suite #106, Casselberry, FL 32707; Robbie Michael, (407) 834-9299

**Tampa Bay R/C Club**, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744

**Three Flags R/C Racetrack**, 1755 East S.R. 44, Wildwood, FL 34785;

Don Meares Sr., (904) 748-3870; fax (904) 748-5263

**Treasure Coast R/C Club**, 4931 Oleander, Fort Pierce, FL 34982; Lou, (407) 464-3207

**West Coast R/C Club**, Lake Park, 17203 N. Dale Mabry, Tampa, FL 33549; Alex, (813) 920-7448; Bert, (813) 654-2554

## GEORGIA

**Carnesville R/C Speedway**, Hwy. 145 S., Carnesville, GA 30521; Bill or Georgia Austin, (706) 335-9044 or 335-3381

**Chalee Park Raceway**, 1800 Pearl Ave., Augusta, GA 30904; Darren Brooks, (706) 738-8929

**Dalton Raceway**, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699

**Dry Branch Raceway**, 3751 Gail Dr., Dry Branch, GA 31020; David Stomper, (912) 477-0139; Brandon Mercer, (912) 746-7519

**Echeconee Superspeedway**, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson/Cliff Kline, (912) 788-8731

**Lake Mayer Raceway**, 1430 Dale Dr., Savannah, GA 31406; Pat Rossiter, (912) 354-0098

**PDO Raceway & Hobbies**, 341 Senoia Rd., Peachtree City, GA 30269; Richard Burdett, (404) 631-1788

**The Racer's Edge**, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls, (706) 648-2637

**Ronnie's Hobbies**, 17050 Jimmy Carter Blvd., Norcross, GA 30092; Gregg Mundkowski, (404) 246-0808

**Sandy Cross Speedway**, Rt. 1, Box 1071, Hwy 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573

**SHILOH R/C Raceway**, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912) 794-2507

**Silver Wings Raceway**, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (404) 991-2225

**Sugar Bowl R/C Speedway**, 5272 North Ave., Sugar Hill, GA 30518; Shelley or Jan Bailey, (404) 945-6709

**Valdosta Hobbies**, 950 N. St. Augustine, Valdosta, GA 31601; Ron Hood, (912) 244-2101

## HAWAII

**Garden Isle R/C Racers**, P.O. Box 3593, Lihue, HI 96766; Eric Leano, (808) 246-8856

**Maui R/C Racing Association**, 430 Hookahi St., #13, Wailuku, HI 96793; Tritech R/C Hobbies; (808) 244-0526

**Radio Control Hawaii**, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629

**Team PRC Racing Club**, 176 Mamo St., Unit G, Hilo, HI 96720; Charlie Kawamoto, (808) 935-3561

## IDAHO

**Capital Dirt Burners**, 1945 N. Teare Ave., Meridian, ID 83642; Jim Brandon, (208) 888-7079

**Falls Hobbies & R/C Raceway**, 1515 Northgate Mile, Idaho Falls, ID 83401; (208) 529-8650

**River City Bandits**, 4867 N. Yellowstone, Idaho Falls, ID; Chris Hummer, (208) 523-9846

## ILLINOIS

**Ameri-Trac**, RR 3, Box 242, Mattoon, IL 61938; Ben or Judy Giles, (217) 235-6873

**AJ's Raceway**, Kesslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772

**BARR**, 809 River Dr., Byron, IL 61010; Jim Haynes, (815) 234-5615

**B.G. R/C Racing & Hobbies**, 56 E. Ferguson, Wood River, IL 62095; Ben or Judy Giles, (618) 254-6301

**C&R Hobbies**, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-4073

**Cedarville R/C Speedway**, 430 W. Washington, Cedarville, IL 61013; Troy Pokoj, (815) 745-2885

**Central Illinois Max Track**, 1013 Iowa St., Ashmore, IL 61912; Josh Carter, (217) 349-8824

**Diehard R/C Raceway**, 300 N. Main, Kewanee, IL 61443; Dick Jennings, (309) 852-3700

**Hobby Town Raceway**, 4611 W. Rt. 102, McHenry, IL 60050; Mike Hollingsworth, (815) 344-1777

**Leisure Hours R/C Raceway**, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)

**Machesney Park**, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311

**Marty's R/C Hobby**, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441

**Mitey Motor Speedway**, 1109 N. Bloomington Rd., Rte. 23, Streator, IL 61344; Doug, (815) 672-4212

**Monee R/C Raceway**, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597

**Peoria R/C Raceway**, 518 Hillsdale Ave., Peoria, IL 61604; Ray Tigue, (309) 672-1780

**R/C Workshop**, 3100 S.W. Adams St., Peoria, IL 61605; Al Kretz, (309) 673-4860

**Racing Time**, 6012 S. Archer, Chicago, IL 60632; Brad or Gino, (312) 767-0773

**Radio-Active Raceway**, 751 N. Bolingbrook Dr., #105, Bolingbrook, IL 60440; Jim, (708) 759-7557

**Redline Raceway**, 921 Harding, Calumet City, IL 60409; (708) 862-8181

**Shiloh Eagles Superspeedway**, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030

**SIRCAR Raceway**, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885

**Slot and Wing Hobbies "Race Place"**, 1615 W. Springfield, Champaign, IL 61821; (217) 359-1920

**Stanton Hobby Shop Inc.**, 4718 N. Milwaukee, Chicago, IL 60630; Tim Copeland, (312) 283-6446

**Superior Raceway**, 1706 W. Bradley, Champaign, IL 61821; (217) 359-8073

**Super Stock Speedway**, 54 Bonnenehl Rd., Collinsville, IL 62234; Thomas Smith, (618) 632-2615

**Valley Farms R/C Raceway**, 706 Bypass 20, Cherry Valley, IL 61016; Dean or Debbie, (815) 332-4516 or (815) 547-5984

**Wayne's World Raceway**, R.R. 1 Box 2146, Danville, IL 61832; Wayne Henk, (217) 446-3419

## INDIANA

**Autograph/Race World**, 231 Pendleton Ave., Pendleton, IN 46064; Sam Mudd, (317) 778-3386

**Bremen Racing Ent.**, 308 N. Bowen, Bremen, IN 46506; Dale Heuberger, (219) 546-3807

**Dave's ATVs, Hobbies & Raceway**, 3035 English Ave., Indianapolis, IN 46201; Dave Sutton, (317) 767-9641

**Elliott's R/C Raceway**, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163

**Hobby Barn Raceway**, 1950 Springhill, Terre Haute, IN 47802-5694; (812) 299-5773

**K&L Hobbies & Raceway**, 3275 North 525W, LaPorte, IN 46350; (219) 324-0353

**Kokomo Hobby & Radio Raceway**, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060

**Main Hobbies**, 625 Columbia, Lafayette, IN 47901; Randy Palmer, (317) 742-2045

**Maple City Speedway**, 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell, (219) 293-1827

**P&T Hobbies and Raceway**, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Losdson, (812) 849-6666, e-mail pthobby@ix.netcom.com

**RC Superdrome & TO Pro Shop**, 14 E. Ave. A, Hutchinson, KS 67501; Joe Jandrikov, (316) 665-6633

**R/C World Raceway**, 217 Brownie Ave., Scranton, KS 66537; Corky or Pam Green, (913) 793-2313

**RCRC Raceway**, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261

**Shawnee Hobby & R/C Raceway**, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Pugh, (913) 384-3211

**Racer's Choice Raceway**, State Rd. 256, Jefferson Co. 4-H Fairgrounds, Madison, IN 47250; Eric Burns, (612) 866-5521

**Race St. Raceway**, 112642 Race St., New Castle, IN 47362; Burke or Butch, (317) 521-4704

**Rimfire Raceway and Hobby Shop**, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), 987-2803 (home)

**The Rink**, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113

## IOWA

**Deib's Speedway**, 423 11th Ave. So., Clinton, IA; Rustis Hobbies, (319) 243-2897

**Dubuque R/C Speedway**, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736

**Hobby Haven**, 7672 Hickman Rd., Des Moines, IA 50322; Jim, (515) 276-8785

**M & M Racetrack**, 2434 Pilgrim Path, Oskaloosa, IA 52577; (515) 673-6265

**Manly R/C Club**, Box 23 (Hwy 65), Manly, IA 50456; Bruce Hill, (515) 454-2025

**Mr. Car Raceway**, P.O. Box 1112, Central Iowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234

**Radio Control Raceway Park**, 746 South 30th St., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780

**Sibley Raceway**, Osceola County Fairgrounds, Sibley, IA 51249; Allen Rock, (712) 754-2604

**Southwest Iowa Hobbies 'n' R/C Raceway**, 204 S. Broadway, Red Oak, IA 51566; Debbie Johnson, (712) 623-5513

**Wild Bill's Raceway**, 901 W. Jones, Knoxville, IA 50138; William Anderson, JR., (515) 842-5973

**Yukon's R/C**, 1851 27th St., Waucoma, IA 52171; David Franzen, (319) 778-2793

## KANSAS

**Dave's Hobbies & Things**, RR 2, Box 150, Cherryvale, KS 67335; David Carey, (316) 336-3683

**Hobbytown USA**, 2016 W. 23rd, Lawrence, KS 66046; Kevin Augustus, (913) 865-0883

**M & M R/C Superspeedway**, 2400 Broadway, Parsons, KS 67357; Mark and Melissa Brown, (316) 421-6742 or (316) 421-5006

**R/C Superdrome & TO Pro Shop**, 14 E. Ave. A, Hutchinson, KS 67501; Joe Jandrikov, (316) 665-6633

**R/C World Raceway**, 217 Brownie Ave., Scranton, KS 66537; Corky or Pam Green, (913) 793-2313

**RCR Raceway**, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261

**Shawnee Hobby & R/C Raceway**, 4603 Shawnee Dr., Kansas City, KS 66106; Bill Pugh, (913) 384-3211

**RC World Raceway**, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE

**Checkered Flag Raceway**, 1790 Bryan Station Rd., Lexington, KY 40505; Billy or Jay, (606) 293-6825

## KENTUCKY

**Bluegrass Int'l/Perry's R/C Hobbies**, 214 Globe St., Radcliff, KY 40160; William Perry, (502) 351-RACE

**Megadrome Raceway**, Rt. 8, Curran Hwy., North Adams, MA 01247; Bob Blanche, (413) 743-7223

**ProTrak R/C Racing**, 3451 Cane Run Rd., Louisville, KY 40211; Tony Hardin, (502) 777-2657

**West Kentucky R/C Hobbies**, 45 Hawkins Loop, P.O. Box 21, Symsonia, KY 42082; (502) 851-3534

**LOUISIANA**

**Cajun R/C Raceway**, 4315 Johnston St., Lafayette, LA 70503; Shannon Ralston, (318) 988-6270

**Indy Speedway & Hobby**, 3753 General DeGaulle Dr., New Orleans, LA 70131; Vince Sheetz, (504) 367-1891

**Pontchartrain Hobby Shop**, 3755 Pontchartrain Dr., Slidell, LA 70458; (504) 649-1199

**Red Dirt Raceway & Hobbies**, 324 Pitkin Rd., Leesville, LA 71446; C.J. Hall, (318) 535-9238

**T & M Pro Hobbies**, 9212 W. Judge Perez Dr., Chalmette, LA 70043; Tom/Melodie Barthel, (504) 271-3111

**MAINE**

**Central Maine R/C Speedway and Hobbies**, 18 Lithgow St., Winslow, ME 04901; David Prescott, (207) 877-2232

**Clay Bowl R/C Hobbies**, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003

**Mementos Hobby Shop**, 86 Sweden St., Caribou, ME 04736; (207) 498-3711

**R/C Speedway & Hobbies**, 87 Main St., Fairfield, ME 04963; David Prescott, (207) 453-4588

**R/C World Raceway**, 87 Main St., Fairfield, ME 04963; David Prescott, (207) 453-4588

**MARYLAND**

**Cockeysville Astrodome Racers**, 10854 York Rd. (rear), Cockeysville, MD 21030; Steve Balaz, (410) 666-2521

**Doug's Raceway**, 2935 Crain Hwy., Waldorf, MD 20601; Doug Moran, Jr., (301) 843-6220

**Hobby Hut**, 7014 B. German Hill, Dundalk, MD 21224; Joe Lamb, (410) 288-5662

**Hobbyworld**, 8220 Ritchie Hwy., Pasadena, MD 21122; Bill Henschen, (410) 544-8782

**The Track**, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630

**Wolffland Hobbies and Raceway**, 2073 Crain Hwy., Waldorf, MD 20601; Perry Pritchard, (301) 870-0293

**MASSACHUSETTS**

**C&C Hobby & Raceway**, 562 Russells Mills Rd., So. Dartmouth, MA 02748; Charlie, (508) 997-4131

**Centerline Hobbies**, 167 Corporation Rd., Hyannis, MA 02601; (508) 771-1244

**East Templeton Model Raceway**, N. Main St., East Templeton, MA; Keith Anderson, (508) 249-4771

**Hi-Tech Hobbies**, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373

**Megadrome Raceway**, Rt. 8, Curran Hwy., North Adams, MA 01247; Bob Blanche, (413) 743-7223

**APRIL 1996 171**

# PROLINE

# TRACK DIRECTORY

**New England R/C Headquarters**, 33 Fr. Devalls Blvd., Fall River, MA 02721; Chuck Gregory, (508) 673-6069

**North East Auto Racers**, 4 Graf Rd., Newburyport, MA 01882; Dave Thibault, (508) 699-9587

**R/C Hobbies & Speedway**, 16 Rio Way, Fairhaven, MA 02719; Toni or Roy, (508) 991-5040

**Speedworld Hobbies**, 134 Water St., Wakefield, MA 01880, (617) 245-3922

**West Street Hobbies**, 114C Main St., Medway, MA 02053; Jim, (508) 533-1231

## MICHIGAN

**Akright Outback Racing**, 984 Zimmer Rd., Williamston, MI 48895; Steve Akright, (517) 655-4531

**Capital Area Racing Society**, The Plumbers Hall, 5405 S. Logan, Lansing, MI; Dave Halsey or Brad Smith, (517) 646-8224 or (517) 484-4028

**Chatter Box Racing**, P.O. Box 164, Old State Rd., Central Lake, MI 49622; Bill Altrogge, (616) 544-9829

**Doug's Dirtway**, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 723-3368

**Down River R/C Association/Riders**, 1519 Oak St., Wyandotte, MI 48192; Dave McCaslin, (313) 287-7405 or (313) 284-1560

**JJ's R/C Speedshop**, 5713 13 Mile Rd. (corner of 13 and Mound), Warren, MI 48092; (810) 977-0420; fax (810) 977-7290

**JT Hobby and Speedway**, 825 Golden Ave., Battle Creek, MI 49015; Jerry or Dan, (616) 965-0571

**Ludington R/C Raceway**, 1483 N. Dennis Rd., Ludington, MI 49431; (616) 843-4654

**MCRC Raceway**, 4601 Page Ave., Michigan Center, MI 49203; Sam Sprang, (517) 787-9161

**Newberry R/C Raceway**, RR 3 Box 2860, McMillan, MI 49853; Dustin Hart, (906) 293-3044

**Pointe R/C**, 2119 Summerton Rd., Mt. Pleasant, MI 48858; (517) 773-5711

**R&L Hobbies**, 9782 Portage Rd., Kalamazoo, MI 49020; Rex Simpson, (616) 323-3686; fax (616) 329-1744

**Rainbow Gardens**, 600 North Shore Ave., Crystal, MI 48818; Mike or Sandy, (517) 235-4298

**Rider's Super Speedway**, 42040 Koppenrick Rd., Canton, MI 48187; Brent Martin, (313) 981-8700 or (313) 451-5599

**Scale Racing Center**, 3432 Highland Rd., Waterford, MI 48328; Larry Rossi, (810) 683-5529

**T/A Raceway**, 119 N. Michigan, Big Rapids, MI 49307; Harvey, (616) 796-3217

**Vicksburg Off-Road R/C Raceway**, 50201 Silver St., Vicksburg, MI 49097; Jeff Schroeder, (616) 375-8591

**Village Hobbies-n-Crafts**, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374

**W.A.R.R.**, 1025 Gilmore Ave., Winona, MI 55987; Patrick Smith, (507) 452-6732

**Westside R/C Raceway**, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Orlowski, (616) 791-9902. (Open May through August)

## MINNESOTA

**Badger R/C Raceway**, 404 Tamarack St., Box 101, Badger, MN 56714; Keith Cumming, (218) 386-2001

**C/S Speedway**, 312 N. Bdwy., Crookston, MN 56716; Caesar Kaiser, (218) 281-6665

**Grand Rapids R/C Speedway**, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751

**Greater Minnesota Racin' Place**, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (612) 252-9768

**Larry's Raceway Park**, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (612) 634-5246

**Minn-E-Golf & Hobby**, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365

**Paul Bunyan Raceway**, Rte. 1, Box 468, Bemidji, MN 56684; Brad Trask, (218) 243-2749

**Range Racing World R/C Speedway**, 412 Jones St., Eveleth, MN 55734; Bill, (218) 744-4423

**Southside Speedway**, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233

**Trackside Racing**, 2300 Myrtle Ave., St. Paul, MN 55114; Winton Oettle, (612) 644-3424

**Wild West R/C Speedway**, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

## MISSISSIPPI

**Fast Freddy's Raceway**, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315

**Joe McFadden Hobbies**, 1619 51st Ave., Meridian, MS 39307; Joe McFadden, (601) 483-7000

**Rural Hill Raceway**, 2535 Tabernacle Rd., Columbus, MS 39702; Jeffrey Alvey, (601) 328-9429

**Small Cars Unlimited**, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST

**Wheeler R/C Raceway**, Rt. 4, Box 569A, Booneville, MS 38829; Doug Holt, (601) 365-3439 or (601) 842-5275

## MISSOURI

**All Seasons Hobby**, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767

**B&L Hobbies & Raceway**, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (314) 431-9444

**Blue Vue Speedway**, 12019 E. 47th St., Kansas City, MO 64133; Mark Randal, (816) 358-0238

**Columbia R/C Trax**, 1502 W. Bus Loop 70 (Exit 125), Columbia, MO 65202; Gary Phillippe, (314) 682-3993

**Extreme Edge Speedway**, 119 W. Liberty St., Farmington, MO 63640; Ken Boren, (314) 756-4122

**GreenTree R/C Racepark**, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194

**K.C. R/C Speedway**, 11426 N. Walnut, Kansas City, MO 64155; Justin Baugh, (816) 436-3638

**Lafayette Riverside Raceway**, P.O. Box 9663, Marshall Rd., Kirkwood, MO 63122; Don Lanningham, (314) 966-8912

**Mid-Mo R/C Raceway**, 400 W. 2nd., Sedalia, MO 65301; (816) 826-5113

**Ozarks R/C Raceway**, Hwy 13, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-2561 or (417) 742-2561

**Suppenbach Winter Racing**, Route 5, Box 66, Pleasant Hill, MO 64080;Larry Suppenbach, (816) 987-5828

## MONTANA

**Bozeman R/C Powerhouse Track**, 2825 W. Main (west side of Main Mall), Bozeman, MT 59715; (406) 586-0071

**Stormer Raceway & Slot Motorplex**, P.O. Box 126 Hwy 2 East, Glasgow, MT 59230; (406) 228-4569

**The Salvation Army**, 4032 Harrison St., Omaha, NE 68147-1012; Lt. Michael Delashmit, (402) 634-3414

**Wild Card Raceway**, RR1 Box 137, Columbus, NE 68601; Roger F. Miller, (402) 564-7743

## NEBRASKA

**Mr. Bill's**, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

**Radio Controlled Race World**, 905 So. Rock Blvd., Sparks, NV 89431; James or Barbara Balough, (702) 356-2882

**Silverbowl Speedway**, 7274 Hardtack Cir., Las Vegas, NV 89119; Mike, (702) 896-3577

**Western R/C Raceway**, 6404 Richmar, Las Vegas, NV 89199; Randy Grigg, (702) 897-7227

**Fastracker Club**, 520 Washington St., Keene, NH 03431; Bill Phillips or John O'Connor, (603) 352-0811 or 357-8393

**Hobby Etc.**, Heritage Place, Rt. 101A, Amherst, NH 03031; (603) 595-8549

**Outback Raceway**, East Washington Rd., P.O. Box 508, Bradford, NH 03221; Jim or Bill Thompson, (603) 938-2425

**Robert's Railroad & Hobbies**, Box 431, Rt. 4 at Rt. 152, Northwood, NH 03261; Robert Jeffers, (603) 942-5193

**NEW HAMPSHIRE**

**Economy R/C Speedway**, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470

**Competition Hobby Supplies**, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 788-3622

**Hal's Hobby Shop**, 120 Cayuga St., Fulton, NY 13069; Hal & April Halsted, (315) 598-2772

## NEW JERSEY

**Bob's American Raceway**, 142 Wilson Ave., Englishtown, NJ 07726; Bob Morrisco, (908) 446-3737

**Family Hobbies Raceway**, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790

**Golden Hobbies Raceway**, 415 Erie Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222

**Hobby Shop Speedway**, 23 State Hwy NJ 08822; Patrick Clark or Eric Lee, (908) 806-7244 or (609) 737-1224

**Jefferson Speedway**, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525

**LBRA Track**, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

**Millville R/C Oval**, 114 N. High St., Millville, NJ 08332; William Densto, (609) 327-4640

**Pit Stop Dragway**, Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-RACE (7223)

**The Race Place**, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215

**Spernelli Speedway**, 2301 Rte. 9 North, Great American Flea Market, Howell, NJ 07731; Mitch, (908) 577-9191

**On Trax Hobbies**, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

**Zeppelin Hobbies**, 92 Rt. 23N, Riverdale, NJ 07457; Lou Ballini, (201) 831-7717

**NEW MEXICO**

**Las Cruces R/C**, 3110 Hillsdale, Las Cruces, NM 88005; Bob Risner, (505) 523-1962

**Meerscheidt R/C Raceway Park**, Walnut and Hadley, Meerscheidt Park, Las Cruces, NM 88001; Wayne Ward, 2230 Coleen Ct., (505) 523-4863, (505) 326-1758

**NEW YORK**

**BarnStormers**, MD #1 Old Oxford Rd., Chester, NY 10918; Lou, (914) 469-8206

**Beach Hill Speedway**, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616

**Brian's Off-Road Track**, 1124 N. Forest, Williamsburg, NY 14221; Brian Was, (716) 633-8155

**Brockport Speedway**, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224

**Brownie's Pro & Sport Hobbies**, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194

**C&D Raceway**, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don Bourquin, (315) 649-5403

**Capital District R/C Racers**, 27 Venus Rd., Albany, NY 12205; Keith Green, (518) 783-7859

**Central New York R/C Auto Racers**, Martin St., P.O. Box 116, Rome, NY 13440; John Orr, (315) 336-5140

**Chipmunk Hill R/C Speedway**, 217 Pine St., Theresa, NY 13891; Ted or Pete House, (315) 628-5065

**Competition Hobby Supplies**, 1006 Loudon Rd., Rte. 9, Latham, NY; (518) 788-3622

**Hal's Hobby Shop**, 120 Cayuga St., Fulton, NY 13069; Hal & April Halsted, (315) 598-2772

**Jerry's Raceway**, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achiles, (607) 277-0940

**LI 1/4-Scale Racers**, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384

**Long Island Raceway**, 168 Broad Hollow, Farmingdale, NY 11735; Bill, (516) 845-7223

**The Model Shop**, 1 Lakewood Ave., Monticello, NY 12701; Richard Cimino, (914) 791-6075

**Mountain Raceway**, Budd Rd., Phillipsburg, NJ 08865; Bruce Roosa, (914) 342-6786

**N.Y. R/C Raceway**, 300 W. 55th St., New York, NY 10019; Jack Zelner, (212) 956-7296

**Performance Hobbies Raceway**, 205 North Ave., Webster, NY 14580; Anthony Cenzi, (716) 621-1274

**Performance Plus Radio Control Speedway/The Hobby House**, 1141 1/2 Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772

**Peter's R/C Raceway**, Rte. 36, Leicester, NY 14481; Peter Scorsone, (716) 382-3126

**P.R.O. Speedway**, 5 Washington St., Cattaraugus, NY 14719; Marc Pritchard, (716) 257-3101

**R/C Competition Corner**, K-Mart Plaza, Mattydale, NY 13211; (315) 455-8718

**R/C Hobbies**, Rte. 49, Box 138, Constantia, NY 13044; Roy Catholdi, (315) 623-9536

**R/C World**, 69-57 Juniper Blvd. S., Queens, NY 11379; Norm, (718) 326-0002

**Rampage R/C**, 27 Fuller Ln., Hyde Park, NY; Brian Walker, (914) 229-2456

**Ransomville R/C Raceway**, 2576 Academy St., Ransomville, NY 14131; Irene Preisich, (716) 791-8310

**Schoharie Co. R/C Car Club**, P.O. Box 126, Cobleskill, NY 12043; (518) 234-4600

**Small Torque Racers of Long Island**, 13 Melony Ave., Plainview, NY 11803; Thomas Bolger, (516) 938-9005

## KEY TO SYMBOLS

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

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**protoform**

**R.J.S. R/C Parkway**, Rt. 9, Box 651,  
John B. Carter Rd., Fayetteville, NC  
28301; Tony Starling, (910) 486-4820



**S&B Speedway & Hobbies**, Rt. 1, Box  
311A, Farmville, NC 27828; Ricky  
Strickland, (919) 753-4422



**Sandhills Raceway Inc.**, US #1 South,  
Aberdeen, NC 28315; (919) 944-7414

**NORTH DAKOTA**

**Hacienda Hills Speedway**, 20  
Hacienda Hills, Minot, ND 58701;  
Kenny Duchscherer, (701) 839-4419



**Northern Mini Racers**, P.O. Box 415,  
Minot, ND 58702; Roger Lee, (701)  
839-5294



**Surrey International Raceway**, RR 1,  
Box 37, Norwich, ND 58768; Marlen  
Lenton, (701) 728-6760



**Valley Hobbies Inc.**, 2714 Main Ave.,  
Fargo, ND 58103; Marshall Skare,  
(800) 493-9971

**OHIO**

**Aerotech Raceway**, 409 Apple Grove  
Rd., North Canton, OH 44720; (216)  
499-1300



**Classic Hobbies**, 1994 E. Waterloo Rd.,  
Akron, OH 44312; Walt Ellis, (216)  
733-6400



**C/R Hobbies and Raceway**, 323  
Center St., Ashtabula, OH 44004;  
Virginia Gagat, (216) 992-3833



**CORCAR/Sams Club**, 128 Amity Rd.,  
Galloway, OH 43119-8732; Bill  
Stevenson, (614) 870-7159



**D&J R/C Raceway**, 801 W. Market St.,  
Orville, OH 44667; Don Yoder or  
Mark Nussbaum, (216) 682-4266



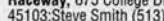
**D&S Hobbies Raceway**, 7701 Crile Rd.,  
Concord, OH 44077; (216) 354-2112



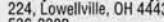
**Flag City Raceway**, 3772 C.R. 18,  
Findlay, OH 45840; Ruth Hubbard,  
(419) 422-5589



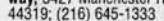
**Fun For All Hobby Center and  
Raceway**, 675 College Dr., Batavia, OH  
45103; Steve Smith (513) 732-0440



**Hobby Mania Raceway**, 6597 Route  
224, Lowellville, OH 44436; (216)  
536-8282



**Innovative Hobbies/Lakeside Speed-  
way**, 3427 Manchester Rd., Akron, OH  
44319; (216) 645-1333



**JB Hobby & Raceway**, 8760 St. Rt.  
201, Tipp City, OH 45371; Bob Curtis,  
(513) 845-8222



**Kent Hobby**, 832 N. Mantua St., Kent,  
OH 44240; Bob Sabo, (216) 673-0422



**Lafferty R/C Raceway**, Box 153,  
70228 Hurrah St., Lafferty, OH 43951;  
Chris Christman, (614) 968-4818



**Medina R/C Raceway**, 754 N. Court  
St., Medina, OH 44256; Bill Aholt,  
(216) 723-0255



**Mid American Raceway**, 13150  
Airport Hwy., Swanton, OH 43558;  
Bill or Chuck, (419) 475-9459



**Mr. T's R/C Super Speedway**, 5540  
CR 16, Wauseon, OH 43567; Nick  
Tinsler, (419) 335-3196



**Performance R/C Club of Ohio**, 2206  
13th St. NE, Canton, OH 44705; Greg  
Lodetter, (216) 453-7089



**Scooter's Hobby Hut**, 234 Robbins  
Ave. #D, Niles, OH 44446; Dave  
"Scooter" Evans, (216) 544-9411



**Ride & Slide R/C Raceway**, 5319  
Yadkinville, NC 28303;  
Jim Woodman, (910) 425-5276 or Bill  
Culbertson, (910) 867-4202



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#1210R—1996 T-Bird Hi Speed

contingent of top-seeded European and British racers such as David Spashett, Oscar Jensen and Phil Davies invaded Ohio after spending time in the Michigan testing. When the qualifying marathon had ended the top qualifier was a "home-grown" racer—Mike Blackstock. Mike outran Spashett to become the 1995 Champion. This was the third year in a row in which Protoform was the choice of the Cleveland champion.

In 1995, Protoform had a clean sweep with three TQs and three A-Mains. Canadian racer Jeff Showler is the new U.S. Indoor Stock Champion, and Skip Starkey is the 1995 Masters Champion. Like Blackstock, they used the no. 1603L Nissan P-35 body. Of the 30 racers in the A-Mains, 25 chose Protoform!

There's good news for 1/2-scale racers who like the WSC-style cars. Check out the new 1/2-scale Courage C41 Body (parts no. 1650L and 1650R). It was too new to run at Cleveland, but it has been tested by some "big-name" racers who said it works great. It has an ultra-low center of gravity, and the front wheel openings are configured in such a way that tire-cutting should be less of a problem.

**New & Hot Protoform Body Styles!**

- 1303 1996 Monte Carlo (wide) regular and lightweight
- 1210 1996 T-Bird HS (high speed, very narrow) regular and lightweight
- 1212 1996 T-Bird SS (high downforce) regular and lightweight
- 1213 1994 Lumina SS (Busch car) regular and lightweight
- 1214 1997 Pontiac Grand Prix SS—very cool! Regular and lightweight
- 1605 1/2-Scale Courage C41 WSC, regular and lightweight
- 1511 "The Bomber" buggy body for RC10B2

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## Racing Around the World!

### 1995 Japanese Pro Nationals

Barry Baker TQ's and wins

### 1995 U.K. 1/12-scale National Championships

Craig Drescher TQ's and wins

### 1995 Cleveland 1/12-Scale Indoor Championships

Mike Blackstock TQ's and wins Modified 8 out of 10 cars used Pro-Line/Jaco tires

### 1995 NORRCA On-Road Nationals

Masami Hirosaka TQ's and wins 1/10 Modified

### 1995 ROAR Carpet Oval Nationals

Pro-Line/Jaco tires TQ and win every class Ron Cutman wins 1/10-scale Modified Frank Polimeda wins 1/12-scale Modified

### 1995 ROAR On-Road Nationals

Mike Lufaso wins 1/10-scale Modified Joel Johnson wins 1/12-scale Modified

*Congratulations and thanks to everyone who has chosen Pro-Line/Jaco tires to go racing!*

## Helpful Hint #4

Low-wear tires have the distinct advantages of long life and superb traction, but these characteristics can make life in the pits difficult. Sometimes, trying to true these tires can be a real problem. There are some tips that can help you to eliminate much of the hassle involved in tire truing.

A good starting point is: never try to take too much material off with a cut. The tire may be deformed or the rubber may actually melt because of the heat. Take your time, and you'll be pleased with the results. If you think that you'll be truing a lot of these tires, it might be wise to invest in a carbide cutter attachment for your machine.

The rules you must follow when you cut the tire's outside diameter also hold true when you round the edges. For this task, a file works very well. Again, to minimize heat build-up, file only for a short time on each side.

Following these hints should decrease your problems and increase your enjoyment of the sport.

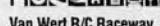


Mounted and Trued F1 Foams

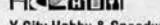
## RACING TO BRING YOU THE BEST!

P.O. Box 456, Beaumont, CA 92223;  
(909) 849-9781; fax (909) 849-2968

Steel Valley Hobbies & Raceway, 157 N. 4th St., Steubenville, OH 43952; William Northrop, (614) 282-3003



Van Wert R/C Raceway, 112 W. Main St. (above Tom's Donuts), Van Wert, OH 45891; Charlie Hire, (419) 238-4917

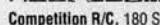


Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025

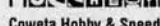


### OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Belgle, (918) 355-1416



Competition R/C, 180 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809



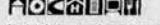
Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Derlaid Seabolt, (918) 486-3948



Off-Road Car Assoc. of Tulsa, 9720 Swan Dr., Broken Arrow, OK 74014; George Gooch, (918) 486-4528



Remote Control Race Course, 400 S. Vermont Ave., Suite 104, Oklahoma City, OK 73108; Rick or Steve, (405) 947-RACE

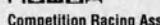


Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686

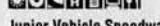


### OREGON

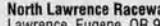
Cathie's R.C. World 443 So. Calapooia, Sutherlin, OR 97479; Wes/Cathie Buzzard, (503) 459-2746



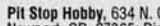
Competition Racing Assoc., 17941 NE Gilsan, Portland, OR 97230; Mark Taylor, (503) 257-0796



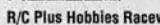
Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (503) 779-3090



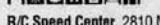
North Lawrence Raceway, 36 N. Lawrence, Eugene, OR 97401; Gary Hill, (503) 484-9857



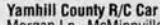
Pit Stop Hobby, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (503) 265-2825



R/C Plus Hobbies Raceway, 2029 25th St. SE, Salem, OR 97302-1130; Ron Smith, (503) 364-9188



R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; (503) 779-8298

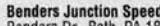


Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

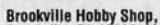


### PENNSYLVANIA

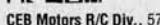
A&D's Bumps & Jumps, RR 7, Box 7395C, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750



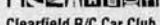
Benders Junction Speedway, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161



Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385



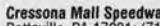
CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635



Clearfield R/C Car Club, P.O. Box 297, Clark Hill Rd., Hyde, PA 16843; Joe Welch, (717) 765-3045



Clearfield R/C Raceway, 4 Capricorn Ct., Clearfield, PA 16830; Shawn Richards, (814) 765-5608



Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506



Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052



East St. Raceway, 736 E. Railroad Ave., Verona, PA 15147; (412) 826-0602



Henning Scale Models R/C Raceway, 128 S. Line St., Lansdale, PA 19446; Bill Henning, (215) 362-2442



Hipkins Hobbies Raceway, 402 W. Avondale-New London, West Grove, PA 19390; Doug Hipkins, (215) 869-8585



Hobbies & Stuff, 116 West Apple St., Connellsville, PA 15425; Mark Schomer, (412) 628-0228



Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765



Hobby House Raceway, Downingtown Marketplace, Downingtown, PA 19335; J.T. Nelson, (610) 269-1300



Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3666



Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223



Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458



Modellbau Ott Hobbies, 1145 E. Philadelphia Ave., (Rt. 73), Gilbertsville, PA 19525; (215) 367-5925



Mt. Laurel Speedway, 835-8 Hiester Lane, Reading, PA 19605; Joe Vaccaro, (215) 921-0176



The Mushroom Bowl, 812 W. Cypress St., Kennett Square, PA 19348; Joe, Bruce, or Drew, (610) 444-1850



Owens Race-A-Rama, RR 2, Box 98 F, Hunlock Creek, PA 18621; Randy Owens, (717) 477-3220



Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; John (215) 632-9744; Bob (215) 945-0325



Pit Stop Hobbies, 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr., (717) 653-6222



Pro Challenge Raceways, Wycombe Ave. (P.O. Box 536), Lansdowne, PA 19050; Bob Paulavage and Don Fewkes, (610) 622-7651



Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288



R/C Raceway, 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490



Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211



Road Runner Raceway, 1027 E. 7th St., Bloomsburg, PA 17815; John, (717) 784-1260



S.A. Hi Banks, Hahn's Dairy Rd., Palmyra, PA 18071; Scott Andrews, (610) 377-6123



Sinking Spring Race Center, 237 South Huff St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760



South Mountain R/C Speedway, 357 Furnace Rd., Wernersville, PA 19565; George Merkel, (215) 267-4736



Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445



T-C R/Cs, 1537 Freeport Rd., Natrona Heights, PA 15065; Tom Coriale, (412) 226-8802



T-N-T Raceway, Randolph Rd., Great Bend, PA 18821; Ed Kraft, Rd. 1 Box 199C, Hallstead, PA 18821, (717) 967-2604 or French (607) 775-1756



Wagonhill Hobbies, 967 New Castle Rd., RT. 422, Butler, PA 16001; Jeff Hyatt, (412) 865-9877



Willow Mill Speedway, 37 N. Season's Dr., Dilisburg, PA 17019; George Verbovitz, (717) 432-4445



### PUERTO RICO

Hacienda Muñoz R/C Track, Carr. #14, Juan Diaz, PR 00795; (809) 837-7083



### RHODE ISLAND

SK Hobbies Inc., 15 Carl St., Johnston, RI 02919; Slim or Keith, (401) 453-1440



Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908



### SOUTH CAROLINA

Bandit's Performance R/C Hobbies, 2037 S. Main St., Darlington, SC 29532; Bryan Howle Jr., (803) 393-3333



Coastal R/C Speedway, 8555 Hwy. 544, S. Myrtle, SC 29577; Wendel Smith, (803) 236-9309



The Great Escape, 105 Franklin Ave., Spartanburg, SC 29301; Jonathan Bowen, (803) 574-5273



Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355



J&M R/C Hobbies, 5341 Dorchester Rd., Evanson Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449



ORA Atomic Racing Facility, 333 Boyd Pond Rd., Aiken, SC 29803; Bill Jackson, (706) 855-0846 or (803) 642-0314



R/C Speed Shop & Raceway, 2122 Platt Springs Rd., W. Columbia, SC 29169; Eric Prevost, (803) 791-4715



Racer's Choice Remote Control, 4014 Mandeville Rd., Piney Grove Shopping Center, Columbia, SC 29212; Clifford McLinden, (803) 561-0000



World Hobbies, 707 Sulphur Springs Rd., Greenville, SC 29611; Bob Pittman, (803) 246-4702 (Closed after 4:00 pm Mondays)



### SOUTH DAKOTA

Action R/C Raceway, 107 N. Main, Mitchell, SD 57301; (605) 996-6895



Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604



### TENNESSEE

Action Hobby Shop, 3723 S. Mendenhall, Memphis, TN 38115; Brian Stricklin or Justin Austin, (901) 365-2620



Cumberland Valley Raceway, P.O. Box 233, Ashland City, TN 37115; Jamie Pace, (615) 792-4371, ext. 1195



D.M.'s Downtown Raceway, 2703 US Hwy. 411S, Maryville, TN 37303; (615) 681-8919



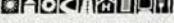
# PROLINE

# TRACK DIRECTORY

**Lawson Raceway**, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (615) 995-9351

**Machine-Head Straits**, 938 Grandmère Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 782-6630

**MSA R/C Racing**, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027



**Robertson's R/C Raceway**, 175 Seavers Rd., Jackson, TN 38301; Travis Robertson, (901) 424-6423



**Sparta Raceway Park**, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Eiford, Rt. 5 Box #652, Sparta, TN 38583, (615) 836-8450 or (615) 761-3407



**Tri-County R/C Raceway**, 919 Little Dogwood, 1312 Kingston Hwy., Kingston, TN 37763; Dwaine Romine, Kyle Romine, (615) 376-2330, 376-9955



## TEXAS

**AA Raceway**, 1617 Foomey Rd., Austin, TX 78704; Wolf Gumpfory, (512) 474-8277



**Austin R/C Center**, 9702 Gray Blvd., Austin, TX 78758; Caton Cobb, (512) 832-8144



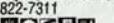
**Big Mike's R/C Raceway**, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814



**Eastex Raceway**, 45000 Hwy. 59 N., New Caney, TX 77357; Tom Keller, (713) 399-9777



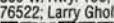
**Flip & Spin R/C**, 5597 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311



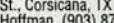
**Hal's Hobby Raceway**, 1440 Bessemer, El Paso, TX 79936; (915) 591-2213



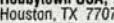
**Heart o' Texas Hobbies & Raceway**, 309 W. Hwy. 190, Copperas Cove, TX 76522; Larry Ghoslon, (817) 547-7505



**Hobbycraft Speedway**, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761



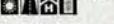
**Hobbytown USA**, 7516 FM 1960 W., Houston, TX 77070; Fred Pfafman, (713) 955-7097



**Hobbytown USA**, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Baisdon, (210) 829-8697; fax (210) 829-8707



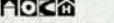
**Houston R/C Hobbies**, 6338 Skyline Dr., Houston, TX 77057; Lynn Cramer, (713) 266-6006



**Indy R/C World**, 220 Mesquite Village, Mesquite, TX 75150; (214) 271-4844



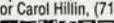
**Keyser's Hobbies**, 1643 Texas, College Station, TX 77840; Bill Bennett, (409) 693-8095



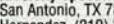
**North Houston Speedway**, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471



**Rivercity Speedway**, 11731 Wetmore, San Antonio, TX 78247; Ralph Hernandez, (210) 359-6870; Joe Toledo, (210) 341-5652



**Star/Car Raceway**, 5802 Patton St., Corpus Christi, TX 78415; Mike Hellums, (512) 289-0066; Race Hotline, (512) 881-6105.



**Star Hobbies**, 1200 Hwy. 100, Box 5, Port Isabel, TX 78578; Fred Carr, (512) 943-7546



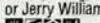
**T&T Eagle**, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562



**Texas Speedway**, 6707 Chimney Rock, Bellaire, TX 77401



**Wild Bill's Raceway**, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Jerry Williams, (214) 438-9224



## UTAH

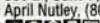
**Fastrax**, 205 N. Carbon Ave., Price, UT 84501; Dave Johnson, (801) 637-6603



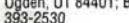
**Intermountain R/C Raceway**, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303



**Power Hobbies and Raceway**, 135 No. 900 E., Suite 7, St. George, UT 84770; April Nutley, (801) 628-8747



**WOR Raceway**, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530



## VERMONT

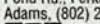
**Bradford R/C Racing**, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674



**Mike's Hobbies & Raceway**, 162 N. Main St., Rutland, VT 05701; Stephen Rachlis, (802) 775-0059

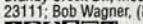


**Stoughton Pond Raceway**, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321



## VIRGINIA

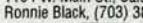
**Bob's Hobbies & Raceway**, 910-J Brandy Creek Dr., Mechanicsville, VA 23111; Bob Wagner, (804) 746-2758



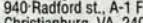
**Cooper's R/C Raceway**, Rt. 4, Box 1228, Chatham, VA 24531; (804) 724-4182



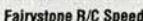
**Crossroads Hobbies R/C Raceway**, 1104 W. Main St., Salem, VA 24153; Ronnie Black, (703) 387-3414



**Dad's Day Off Hobbies & Speedway**, 940 Radford st., A-1 Flea Market, Christiansburg, VA 24073; David A. Schuh, (703) 382-9811



**Fairystone R/C Speedway**, Rt. 4, Box 918, SR635 Goblintown, Stuart, VA 24171; Pat Moon Jr., (540) 930-3984



**Hobby Hangers Speedway**, 4433 A. Brookfield Corp. Dr., Chantilly, VA 22021; Mark or Billy, (703) 631-8820



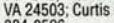
**The Hobby House**, 116 Edds Ln., Sterling, VA 20165; Ron Beckman, (703) 444-0333



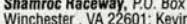
**KC's Radio Control & Repair**, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596



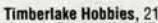
**Shamrock Raceway**, P.O. Box 3739, Winchester, VA 22601; Kevin Allen, (703) 662-0403



**Timberlake Hobbies**, 212 14th St., Virginia Beach, VA 23451; Doris Cruea, (804) 491-8016



**Trackside Hobbies**, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell or Tom Gunther, (804) 723-4170



## WASHINGTON

**Allie's**, 108 South K St., Aberdeen, WA 98420; (206) 533-6638



**Four Season R/C Racing**, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary & Sharon Brown, (206) 491-2430



**Hale's R/C Raceway Park**, 10611 136th St. E. Puyallup, WA 98374; Walt Hale, (206) 845-7675



**Home Town Hobby**, 116 N. Main Ave., Ridgefield, WA 98642; (206) 887-1769



**L&L R/C Raceway**, 15818 S.E. 287th, Kent, WA 98042; Bob Lewis, (206) 631-1664



**Performance R/C**, P.O. Box 955 (1673 Cedarvale Rd.), Mt. Vernon, WA 98273; (206) 755-9464



**Raceway Hobbies**, 188 Sunset Ave., S., Edmonds, WA 98020; Dave or Ron Stein, (206) 774-3285



**Rattlesnake R/C & Raceway**, Brag T-121 Big Pasco, Pasco, WA 99301; Bill Brandt, (509) 545-4495



**Schmidt's Auto Parts**, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838



**Skagit R/C Raceway**, 1689 Routon Ln., Burlington, WA 98233; Jeff, (206) 724-3543; Craig, (206) 755-9464



**Sokane Indoor Raceway**, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Matsen, (509) 534-RACE



**Tacoma R/C Raceway Hobbies**, 6305 6th Ave., Tacoma, WA 98406; Nell Bade, (206) 555-1935



**Terror Raceway**, 8012 S. Tacoma Way, Tacoma, WA 98499; Dave Kleinman, (206) 584-8659



**WASHINGTON, D.C.**

**BAFB R/CAR**, Bolling Air Force Base, Washington, D.C. 20332; Charles Leadbetter, (301) 297-4524



**WEST VIRGINIA**

**Burr-Fab Raceway**, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487



**Fulton's R/C Raceway**, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 323-5355



**Left Turn Hobbies**, 100 Saco Ln. (by Post Office), Glen White, WV 25849; Stretch, (304) 255-3930



**WISCONSIN**

**ABC R/C**, 1441 B East Main St., Waukesha, WI 53186; Dick, (414) 542-1245



**Antigo Hobby**, 311 Superior St., Suite 7, Antigo, WI 54409; (715) 623-7655



**Bayland Hobbies**, 9510 Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288



**JJ's Dirt Heaven**, 6028 County K, Champion, WI 54229; (414) 866-9096



**Mid-West Tri-Clone**, 3745 Shuster, West Bend, WI 53095; Tom Holz, (414) 334-0429



**NASCAR Raceway**, 4331 E. Wall St., eagle River, WI 54521; Mary O'Brien, (715) 479-5154



**Racing Mania**, 129 Harrison St., North Prairie, WI 53153; Bill Bowes, (414) 392-9515



**Timberlake Hobbies**, 212 14th St., Virginia Beach, VA 23451; Doris Cruea, (804) 491-8016



**Trackside Hobbies**, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell or Tom Gunther, (804) 723-4170



## CANADA

**Action WHEELZ**, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756



**A&J Toronto R/C Raceway**, 24 Main St., Building B, Unionville, Ontario L3R 2E4; (905) 305-1479



**ATN**, Auto Teleguide Nicolet, 2000 Rue Paul Hubert, Saint-Jean-Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097



**Circuit Pepsi**, Centre de Location, 37 du Roil, Sorel, Quebec; (514) 746-8828



**Circuit Plessis**, 260 Raug 9 Ouest, Plessisville, Quebec; (819) 362-3743



**Circuit R/C Pro**, 1500 Chemin Sullivan, Val-d'Or, Quebec; J9P 1M1; R/C Model Plus, (819) 874-3918



**Circuit Teleguide St. Roch**, 363-B St. Charles, St. Roch De L'achigan, Quebec J4R 3H0; (514) 588-4254, fax (514) 588-6554



**CRCC**, Box 309, Clinton, Ontario N0M 1L0; Eric Russell, (519) 482-9429



**Dynamic Hobbies**, 21 Concourse Gate, Unit 6, Nepean, Ontario K2E7S4; Clark Freeman, (613) 225-9634



**East Coast Model Center Raceway**, 13 Glen Stewart Dr., Suite 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262



**Evolution Speedway**, 1935 Glengrove Rd., Pickering, Ontario L1V 204; Eric Lang, (905) 839-2084



**Fast-Trax Speedway**, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411



**Fly N' Bryan's Radical Raceway & Little Shop of Hobbies**, RR #1, Site 12, Comp. 49, Chase, British Columbia, Canada V0E 1MO; Bryan Coffey / Dani Potvin, (604) 955-0669



**Honda House Motor Speedway**, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530



**Interior R/C Raceway**, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhoven, (604) 374-1268, (604) 374-8458



**J-T International Raceway**, 127 Milligan Lane, Nanapee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099



**Minutiae & Passions**, 204 St. Charles, #103, Ste. Therese, Quebec, Canada J7E 2B4; Gilles Lachance, (514) 979-7989



**MORRAC Raceway**, 6449 Crowchild Tr. S.W., Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386



**KEY TO SYMBOLS**

## KEY TO SYMBOLS

Indoor

Outdoor

Off-road

Oval

Dirt oval

Carpet

Concrete

Asphalt

On-site hobby shop

AC power

&lt;p

**Off-Road R/C Raceway**, 76 Eddystone Ave., North York, Ontario M3N 1H4; Ron LeFebvre, (416) 740-0536



**Prince George Radio Controlled Car Club**, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035



**Quintrax Speedway**, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306



**Randy Shantz Raceway**, 1015 W. 14th St., North Vancouver, British Columbia; Steve Mulhall, (604) 945-3888



**RC World**, 7070 Haldibrook Rd., RR 1, Caledonia, Ontario N3X 2B8; Don Nichols (905) 679-3177 or Keith Seguin (905) 388-9855



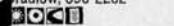
**Ronbo's R/C Racing**, RR 1 Glen Walter, Cornwall, Ontario K6H 3G4; Ron Giroux, (613) 936-0176



**Roussillon Hobby Track**, 177-D St-Jean Baptiste, Chateauquay, Quebec J6K 3P4; (514) 698-2151



**Sheldon's Raceway**, Box 597, Cutknife, Saskatchewan; Sheldon Bradlow, 398-2232



**Spinnin' Wheel Raceway**, RR 1, Ariss, Ontario N0B 1B0; (519) 824-1614



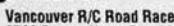
**South Okanagan Roadhogs**, Skaha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698



**Strathclair Park**, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855



**Thunder Alley Raceway**, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361



**Vancouver R/C Road Racers**, #100-2733 Barne Hwy., Coquitlam, British Columbia V3E1K9; Roger Brown, (604) 945-3888



## COLUMBIA

**Club de Automodelismo Colombiano**, Centro Comercial Cafam, Kilometro 14 Autopista Norte, Santa Fe Bogota, D.C. Colombia; Jorge Delgado, 1-6130588



**Club de Automodelismo Colombiano**, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santa Fe Bogota, D.C. Colombia; Jorge Delgado, 1-6130588



**Garosa Raceway**, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 75-751892



## CYPRUS

**Racing Model Club**, Kennedy Ave. N. 42, Nicosia, Cyprus; Andrea Sotiriou, 493186; fax 493229



**Denmark**

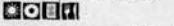
**Brondy Motor Club**, Roskildevej 460 Rodovre, Denmark 2610; Soren Bay Holst, 011-45-31-472-462



**Holstebro R/C Buggy Club**, Mozartvej 500 Holstebro, Denmark 2600; Michael Brusholt, 011-45-97-412-734



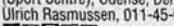
**Klub 144 Raceway**, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691



**Rainbow Raceway**, Eriksvej 9, Iosstrup, Copenhagen 2600; P. Christensen, 011-45-52-848-504

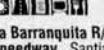


**Thor Minirace Odense**, Schusvej 255, Allesø, Odense, Behind Alessø Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 011-45-65-303-707



## DOMINICAN REP.

**Adoca R/C Speedway**, Feria ganadera, Santo Domingo; (809) 220-5266



**La Barranquita R/C International Speedway**, Santiago; (809) 582-2303



## ENGLAND

**Chessington Radio Car Club**, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey, England; Ian Spiller, 0252-20657

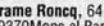


**Hinckley RCCC**, Three Pots Inn, A5 Wathing St., Hinckley, Leicestershire, UK; Bruce, 01455-890580



## FRANCE

**Auto Electron**, 35, rue B. de Vendour, Limoges, France 87000; M. Boudoul, 55 062763



**Crame Roncq**, 64 rue du Béguerel, 59370 Mons el Baroeul, France; Michael Hondeky, (33) 20042755



**Lorgies Bolides**, rue Beau-Riu, 62840 Lorgies, France; Mme Hourdequin Sabine



## GERMANY

**Dreykorn Raceway**, Heuchlinger Hauptstr. 43, Lau 91207; Hermann Hensel, 0913-81457



**MC Köln**, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493



**Mini Car Dortmund**, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwahn, 0231/213609



**Oberhausen-Alstadt**, Am Fesderturm., Oberhausen, Germany 46099; Josef Holl, 0208-403676



**Panik Raceway**, Teutonen Str. 5, Jroisdorf, Germany 53844; Guido Kraft, 0224-400259



**Stoppelhooper Oberhausen**, Niebuhrstr., Oberhausen, Germany 46049; Matthias Reckward, 02801-1545



## GUAM

**R/C International Raceway**, P.O. Box GK, Agana; Robert (Buddy) Simpkins, (671) 477-3207



## HONDURAS

**Autodromo Accion**, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061



## HONG KONG

**H.K.R.C. Model Car Racing Club**, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822



**Kingsville Buggy Arena**, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828



**Cipaku Indah Speedway**, JI Cipaku Indah II/2, Bandung 40143, Indonesia; Cipaku Indah Hotel, Bad Lake, 011-62-22-210219



**Everly's Racing**, Palm St., 188, Surabaya, Jatim, Indonesia; Jhon Mudik, 011-62-31-595-888

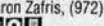


**Nahshoneat**, Abba Nillel Silver Str. 64, Haifa, 32809; Golan Levy, (972) 03386444 or (972) 04231252



## ISRAEL

**Ircce Off-Road**, Rahanna, Israel; Yaron Zafiris, (972) 030549937



## NETHERLANDS

**H.F.C. Hollandia**, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820



## ITALY

**Associazione Modellisti Cossato**, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romildo, 015-405881; fax 015-922709



## JAPAN

**Courtney Off-Road**, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



**Foster R/C Raceway**, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 011-81-61173-53674



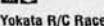
**Hansen Off-Road**, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 011-81-61173-53674



**Iwakuni R/C Track**, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 011-81-6117-53-3662



**Misawa R/C Raceway**, 13th Fighter Squadron, PSC 76, Box 2585, AP 96139-2585; 011-81-176-53-5181, ext 225-6506



**Yokata R/C Racers**, PSC #78, Box 3619, AP 96326, Tokyo, Japan; Victor Giles, 011-81-0425-52-2511 ext 225-9025



**Zama Off-Road Raceway**, 17th ASGM Unit 45013, Box 3232, AP 96338 Japan; SFC Ken Campbell, 011-81-3117-63-8478



## LEBANON

**Wild Willy RCC**, Oscar St-Jal Eddie, Beirut, Lebanon; 00961-1-403751



## MEXICO

**Aices Off-Road**, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, (667) 1476, 61477, 86729



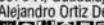
**Baja Jr.**, H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gabi Macias, 681-2076; fax, 681-26430



**Club Kyoshi de Automodelismo Apurico**, Av. Pacifico 216 Coyoacan; Ajusco-Toluca Km 15.3 DE Mexico 04330, Ing. Jorge Perez Holder, (525) 548-0896, fax, (525) 544-7133



**Hobby Centro**, 12 De Diciembre No. 3070-A, Guadalajara, Jal 45550; Alejandro Ortiz Del Toro, (36) 21-46-28



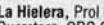
**Hobby's Formula**, Av observatorio 457 DF 01120; (905) 502-3620



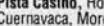
**Hobby Model's Raceway**, Blvd. Garcia de Leon, 1555, Morelos, Michoacan 58260; (431) 5-01-22



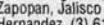
**Jaguar R/C Club**, Calz. Zavaleta 116, Puebla 72150, Chema, Denise or Chiro, (22) 31-00-91, (22) 33-00-94



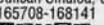
**La Hieler**, Prol Corregidora Nte 350, Queretaro, QRO C.P. 76160; Jorge Morelos Rabell, (42) 12-15-25



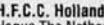
**Pista Casino**, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhart, (73) 19-12-38



**R/C Racing Club**, Oaxidiana #2900, Zapopan, Jalisco 45460; Fernando Hernandez, (3) 616-73-47

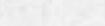


**Tony's Track**, Obregon 364 Sur, Culiacn Sinaloa; Guillermo Prieto, (67) 165708-168141



## NETHERLANDS

**H.G.C. Hollandia**, De Werf 60, The Hague, The Netherlands; G. de Jong, 031-070-3679820



## NEW ZEALAND

## NEW ZEALAND

**Counties R/C Raceway**, Pukekohe Showgrounds, Station Rd., Pukekohe, New Zealand; R. Northcott, 09 23 86904



**Harewood Radio Control Car Club**, 550 Sawyers Arms Rd., Christ Church, New Zealand; Dean Johnson, 09 388 344



**Papakura Indoor R/C Car Club**, 25 Tairua Cres., Papakura, Auckland, Colin Perry, (09) 298-4711



**Western District R/C Off-Road Car Club**, CNV Bancroft/Akateri Prive, Auckland; Chris, (09) 838-5201

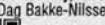


## NORWAY

**Aurskog R/C Club**, Aurskogen, 1930 Aurskog, Norway; Tommy Gjeleseth, 47-63-86-21-61



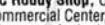
**Dalen Raceway**, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95



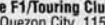
**Hadeland Raceway**, 2750 Gran, Gran Norway; Dag Bakke-Nilssen, 61330405



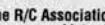
**Store-Baller Raceway**, 2750 Gran, Gran Norway; Ola Raastad, 6133025



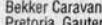
**Aurskog R/C Club**, Aurskogen, 1930 Aurskog, Norway; Tommy Gjeleseth, 47-63-86-21-61



**ERMC Raceway**, 14 Ch de Taverney, 1218 Grand-Saconnex, Switzerland; M. Maurer, 19-41-22-978-965



**Pretoria Off Road R/C Club**, Joost Bekker Caravan Park, Mayville, Pretoria, Gauteng; Gert Swart, (012) 377-3238

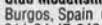


**SPAIN**

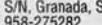
**ADAM**, Mina Flores de la Sienna, Madrid, Spain; Alvaro Sarabia, 01-7471113



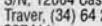
**Club Modelismo Catilla**, P.O. Box 491, Burgos, Spain 09080; A.J. Pereda, 011-34-47-240130



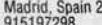
**Club Social Sevillana**, Ctra. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282



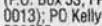
**Motoclub Castellon R.C.**, Rafalafena, S/N, 12004 Castellon, Spain; Octavio Traver, (34) 64 229705, (34) 64 237411



**Outlaw-Ultima II**, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298



**ROARCR**, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); P.O. Kelly Sexton, 011-34-56-822652



**CRAEM**, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952

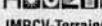


**SWITZERLAND**

**E.M.B.C.M. Raceway**, Main Street, opposite police station, 8854 Sieben, Switzerland; Markus Schmid, 01-9233621



**ERMC Raceway**, 14 Ch de Taverney, 1218 Grand-Saconnex, Switzerland; M. Maurer, 19-41-22-978-965

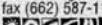


**JMRCV-Terraindu Levant**, Chemin ou Levant, 1290 Versoix, Geneva, Switzerland; fax, 19 41 22 7790805

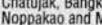


**THAILAND**

**Bangkok R/C Spa Huamark**, 16/1 Landprao SOI 96, Wangthonglang Bangkok, Bangkok, Thailand 10310; Mr. S. Sanghavasi, (662) 931-8390, fax (662) 587-1186



**Radio Control Speedway**, 16 Soi Suea-Yai-Uthit, Rajadapisek Rd., Chatujak, Bangkok 10900; Mr. Noppakao and Mr. Suteerapong S., (66-2) 541-6398 or fax (66-2) 541-6399



**Mosi-Oa-Tunya**, H9619 Highland Harare, Harare Country, Maslorskland, Zimbabwe; 46237

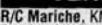


**BB & OTO Güven Raceway**, Gaziosmanpaşa Sokak Kadıköy, Goztepe Kt, Istanbul, 0216-4186118, or 0216-3490742

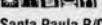


**VENEZUELA**

**R/C Mariche**, KM 4 Zona Industrial, Del Este Via Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993



**Santa Paula R/C Club**, Polideportivo de Santa Paula urbanization Santa Paula El Cafetal, Caracas, P.O. Box 6688 Plaza 96, Venezuela; Isaac Abecasis 02-2423954 or Franco Agrusa 02-4510314



**WEST INDIES**

# BACK LOT

## Going Past Four Minutes

In America, we race for four minutes, by God! While the rest of the civilized world uses a standardized system of five-minute heats and Mains, we've held out—like with the metric system! A recent flurry of reader mail on this subject has prompted a debate between me and our esteemed executive editor, Frank "I don't care if you're right, we'll do it my way" Masi. I'm for lengthening races from four to five minutes or longer, while Frank thinks that we should stay at the current four minutes. I know...how can anyone think I'm wrong? Here are the arguments.



DEAD END

**This is my page—mine!**

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o RCCA, 251 Danbury Rd., Wilton, CT 06897. My internet address is: chris@airage.com

Chris, as always, you're in the dark! First of all, I agree with all your points; but you've missed the most important reason against lengthening race time: the longer the race, the larger the role of battery quality, i.e., cost, becomes.

OK, you don't get it yet. I'll explain. Your average racer who uses sport-type battery packs enters one of these five-minute races. He's used to gearing his motors to make four minutes. The first time out on the track, he dumps at four minutes. He goes down a tooth on his pinion gear. He then dumps at four minutes, 15 seconds. Eventually, he figures out the correct gear ratio that will allow him to make the run time with his batteries. Unfortunately, another guy with the same motor but with expensive, matched packs has no trouble making the run time without having to gear down!

You think this is fair? Our hero gets his doors blown off in the new five-minute format even though, previously, he had been just as fast as the other guy (because his batteries were good enough for four minutes). Get it? To race in a longer event, lots of people will have to spend more on better battery packs. As usual, Chris, you've jumped into the deep end without your inflatable sea horse!

**Chris,  
you're in  
the dark!**

### CHRIS: POINT

Frank,  
you  
idiot!

minutes. We can stay out all day. Ha ha!" As obnoxious as they sound, they're right! Although electrics can't hope to run as long as gas vehicles (yet), an additional minute (or two) in each heat and Main might make electric racing more appealing to those who would otherwise choose gas because of the extended run time it provides.

I'm sure you've heard people criticize four-minute electric races for requiring perfect, "no mistake" driving because there isn't enough time for a comeback if you bobble. Longer races would provide that time. Plus, with longer races, conservation of battery power and race strategy would play larger roles.

Finally, as if I need to add more to make my point, longer races would make it necessary to gear motors more conservatively to make the run time. This means that motors would run cooler because they'd be under less strain.

Over to you, knot-head!

### VOICE YOUR OPINION

Got an opinion on this subject? Write, fax, or e-mail me care of Chris's Back Lot, *R/C Car Action*, 251 Danbury Rd., Wilton, CT 06897; fax (203) 762-9803; e-mail: chris@airage.com